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TECHNICAL REPORT

# ASSESSING MALI'S L'AGENCE NATIONALE DE LA MÉTÉOROLOGIE'S (MALI METEO) AGROMETEOROLOGICAL ADVISORY PROGRAM FINAL REPORT ON THE FARMER USE OF ADVISORIES AND IMPLICATIONS FOR CLIMATE SERVICE DESIGN



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Cover Photos, top then bottom row, from left: Interviewing a farmer in Kéniéroba, Mali on his agricultural decision-making; Kéniéroba, Mali; Interviewing farmers in Kéniéroba, Mali on their agricultural decision-making. Photo credit: Edward R. Carr

# ASSESSING MALI'S L'AGENCE NATIONALE DE LA MÉTÉOROLOGIE'S (MALI METEO) AGROMETEOROLOGICAL ADVISORY PROGRAM

## FINAL REPORT ON THE FARMER USE OF ADVISORIES AND IMPLICATIONS FOR CLIMATE SERVICE DESIGN

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# ACRONYMS

CMDT	Compagnie Malienne pour le Développement du Textile
CSCOM	Centre de Santé Communautaire
CSM	Crop Simulation Model
FCFA	Franc Communauté Financière Africaine
FEWS-NET	Famine Early Warning System Network
HURDL	Human Response and Development Lab
LIG	Livelihoods as Intimate Government
NFE	Non-Farm Employment
USAID	U.S. Agency for International Development

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# EXECUTIVE SUMMARY

## Background

This report marks the completion of the first detailed assessment of the function and impact of an operational climate services for development program, Mali's L'Agence Nationale de la Météorologie's (Mali Meteo) Agrometeorological Advisory Program. Viewed within both the climate services and development communities as highly successful, the Agrometeorological Advisory Program had never been independently assessed. In 2011, USAID's Office of Global Climate Change commissioned this assessment to understand how the program functioned, and the degree to which the program impacted the lives and livelihoods of the farmers it was designed to benefit.

A preliminary report (Carr, 2014) compiled findings on the history and administrative structure of the program, assessed the scientific basis of the advisories, gauged the level of use of the advisories and, where they were being used, the impact of the advisories on livelihoods decisions and outcomes. Among the most important findings of this report were extremely low overall rates of advisory use, with women often lightly engaged with the advisories, if at all.

This final report incorporates a new round of qualitative field data from southern Mali to explain the patterns of use, both the low rates of advisory use overall, and the differences in advisory use seen across different social groups in southern Mali. These findings are critical for advancing the use of climate services in development. They speak to the particular issues faced by the Agrometeorological Advisory Program, and therefore serve as a productive foundation to reshape this program to better achieve its goal of supporting the food security and livelihoods of rural Malians. At the same time, these findings speak more broadly to the effective design of climate services for agrarian development, and indeed development more broadly. As such, these findings will help inform the design, as well as the future monitoring and evaluation, of climate services aimed at development goals.

## Main Findings

This report confirms the low rates of advisory use, and the extremely low rates of women's advisory use, identified in a preliminary assessment of the program. Between the preliminary report, and the findings of this report, it is clear that in most communities less than 20% of those with access to advisories are using them.

The principal factor shaping advisory use appears to be access to draught animals and agricultural equipment necessary to respond to advisories. Those who own these animals and equipment, or who enjoy very easy access to these assets, can respond to advisories in a timely manner. Further, they can plant earlier in the season (as they are not waiting for others to finish planting before accessing these assets), which presents them with a wider range of cycle length (how long it takes a crop to mature to harvestable form) decisions than those who plant later in the season and may be forced to select short-cycle varieties to address the limited time remaining in the season.

The advisory program works best for farmers who are located in relatively stable agroecologies, and in livelihoods zones where the marketing of crops is a common activity. In the southern- and westernmost parts of Mali, rates of advisory use among those with the necessary livelihoods assets ranged between 40% and 50%.

This program has the lowest uptake among those farming in marginal environments, who we might assume are in the greatest need of advisories. In the northernmost parts of southern Mali, advisory use was between 13% and 20% for those with the livelihoods assets necessary to follow advisories. This is explained by the fact that wealthier individuals in this part of Mali begin to shift their livelihoods out of sedentary agriculture and into animal husbandry, and therefore those that have the assets to use advisories are often disengaging from the agricultural activities these advisories inform.

While access to livelihoods assets is an important determinant of advisory use, so too are the roles and responsibilities that emerge at the intersection of seniority and gender. In every livelihoods zone covered in this assessment, women's rates of use were less than half that of men, and usually women were not using the advisories at all.

The socio-cultural values attached to livelihoods activities and decisions have significant impacts on the use of climate services. In southern Mali, livelihoods decisions incorporate not only concerns for adequate food and income, but also identity-appropriate roles and responsibilities that shape participation in livelihoods activities. In short, the basis upon which different livelihoods decisions are made are often much wider and more complex than often considered. For example, among the different ethnicities surveyed in this report, all vest agricultural decision-making with the male head of family or household. That man is, in all cases, preoccupied with living up to the expectation that he feed and provide for his family and/or household, focusing his production on his subsistence production. More junior men, and all women, were expected to help the senior man meet this responsibility on his farm. Only after this senior man felt his obligations had been met were junior men and women freed to work on their own plots. This delays their planting, sometimes so late into the season that they are forced to plant short-cycle crops and advisories provide little added value.

*By themselves, climate services are unlikely to trigger widespread changes in livelihoods activities or outcomes.* Currently, given the social structures of agricultural livelihoods in southern Mali, the wealthiest men in any given community are the most able to use advisories. Therefore this program benefits the already-rich. It is unclear if the benefits of this program indirectly trickle to other, less wealthy members of the community, and it is unlikely that these men would welcome challenges to their authority.

*Effective climate services must fit themselves into the world of the user to allow for their uptake.* Beyond the obvious politics of wealth that might shape the adoption of new climate services described above, to alter the structure of agricultural decision-making in rural parts of southern Mali is to fundamentally rework the world in which the farmer lives, and that farmer's place in the world. Therefore, farmers are more likely to embrace services that work within the existing structure of livelihoods, culture, and society.

There are opportunities to use carefully designed and targeted climate services as catalysts for changes in livelihoods and livelihoods outcomes. Well-designed climate services, while speaking to the current socio-cultural context that shapes their use, can identify opportunities to catalyze social change by looking for individuals and situations that present exceptions to sociocultural expectations, and therefore opportunities for social and livelihoods change.

## **Recommendations**

### In Mali:

Combine future climate services efforts with agricultural development programs that enhance the livelihoods and agricultural assets of farmers. The current Agrometeorological Advisory Program is employed by a significant number of asset-rich farmers in the southernmost part of Mali. Combining future climate services efforts with programs that enhance the livelihoods and agricultural assets of a

wider segment of the population would likely result in higher uptake of the advisories. Further, the advisories could provide information that reduces the risks associated with credit-based financing of agricultural improvements.

Advisories addressing the future state of forage for animals should be introduced to better meet the overall needs of populations in arid and marginal agroecological zones. In these zones, the utility of existing advisories wanes because the wealthiest members of the community most able to use the advisories appear to shift from agricultural toward pastoral livelihoods..

The Agrometeorological Advisory Program should seek out women who are already transcending these expectations in their lives and livelihoods to identify opportunities for new climate services. Women's use of advisories is very limited due to deeply held understandings of their appropriate roles and responsibilities, both in domestic space as well as in the fields. To engage women in the use of advisories, future climate service design efforts should explore how these women illustrate pathways to social and livelihoods change that could be supported by weather and climate information.

Any future climate services issued by the Agrometeorological Advisory Program should first be vetted with farmers of different asset wealth, gender, and seniority to understand who would benefit from that information, and who would be disadvantaged. This will prevent the design of services that have no constituency (such as information on seasonal onset, which was largely rejected by the farmers in both this and the preliminary study) as well as services that promote conflict within communities, families, and households. Ideally, such a process would be iterative, allowing representative farmers to play a co-constitutive role in the design of the services, improving their salience, legitimacy, and credibility (Carr & Owusu-Daaku, 2015) and thereby improving their future uptake.

#### For climate services for development more broadly:

Climate services should be coordinated with other development programs and interventions to build mutually-reinforcing programs that more robustly address the targeted challenge than would be possible as stand-alone interventions. Climate information is only useful if the intended users can act upon the information provided.

*Climate services produce uneven benefits in target populations.* Because their utility is predicated on the ability to act on the information they provide, climate services will often disproportionately (or more directly) benefit the wealthy and the powerful in the user community. This may not always be a problematic outcome, especially in situations where the rapid augmentation of farm production or economic activity is needed to alleviate an acute stress such as famine or post-disaster recovery. However, those working with climate services for development should design programs and build expectations for outcomes with this in mind.

The design of climate service programs and specific services must assess social expectations and roles among user communities if they are to design sources of information that are salient, credible, and legitimate to the intended users. Even among those with similar levels of access to livelihoods assets, the ability to act on climate services is deeply embedded in sociocultural expectations of livelihoods and the roles different individuals should play in livelihoods activities.

Climate services can serve as tools for social transformation, but this will likely be effective only if such services leverage and support existing indigenous/local efforts to transform society or livelihoods. Social roles and responsibilities are deeply embedded in local cultures, and manifest themselves in activities that transcend agriculture and livelihoods. They are not easily changed. Agents of social change in the target population, such as male farmers who decide to plant a “woman’s crop” because the changing

agroecology warrants it, or women who decide to head their own households and earn more money than their husbands, have already charted a path to change. Climate services programs can and should build on these pathways to catalyze new livelihoods outcomes.

# I. INTRODUCTION AND BACKGROUND

Climate services<sup>1</sup> have the potential to become critical development tools for addressing weather- and climate-related vulnerabilities and building resilience to climate variability and change among poor populations around the world. However, relatively few working climate services programs exist in the Global South, and we know even less about their function and impact. Further, such programs exist in institutional, environmental, and economic contexts distinct from those in the Global North. Therefore, to better design and deliver climate services for development, we must learn from the successes that these programs have achieved, and the challenges such programs have faced. This report marks the culmination of the first major effort to learn from such a program, Mali's Agrometeorological Advisory Program.

The Agrometeorological Advisory Program has long been held up as climate services for development success story (e.g. Hellmuth et al., 2011). Founded in the early 1980s as a pilot effort to address drought-associated food insecurity ravaging Mali and the wider Sahel, the program was designed to take weather and climate information and translate it into usable advisories to guide farmer's decisions throughout the agricultural cycle, from variety selection and the timing of planting to the timing of input application. The program has since reported tremendous impacts on farmer behavior and agricultural outcomes. Further, the program has endured for over 30 years, surviving a transition from donor funding to government funding in 2005. Perhaps because of the enthusiasm for the program in the development community and the apparent indications of program impact, there had been no independent assessment of this program in its history. The program, set up as an emergency measure, was rapidly scaled up after a small pilot phase demonstrated promising outcomes. It was never designed with evaluation or assessment in mind. Without such assessments, however, it was impossible to learn from the experiences of the program to inform the design of other programs with similar aims.

In 2011, USAID commissioned an assessment of the Agrometeorological Advisory Program to independently assess the science behind the advisories, the reliability of the advisories, the use of the advisories by farmers targeted by the program, and the impact of the advisories on the livelihoods of those who used them. An initial assessment (Carr, 2014a) captured the following:

1. Meteo Mali's current seasonal forecast methodologies are based on past experiences that may no longer reflect the climate dynamics of the region. These methodologies require quantitative verification, and the assessment of their scientific basis due to the emergence of trends in extreme precipitation behavior, such as drought and flooding, that may be attributable to anthropogenic influence.

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<sup>1</sup> According to the Global Framework for Climate Services, climate services are climate-based information designed to prepare users for the weather they will actually experience. ([http://gfcs.wmo.int/what\\_are\\_climate\\_weather\\_services](http://gfcs.wmo.int/what_are_climate_weather_services)).

2. There are significant questions about how climate information is translated into an advisory. Currently, advisories for each crop direct farmers to plant a crop variety of a single cycle length that is tied to the most probable seasonal length and total precipitation. However, often the most probable outcome is only 60% likely, with significant likelihood of deviations to longer or shorter seasons, or more or less precipitation. The advisories could, under some circumstances, increase the risk of inadequate harvests or crop failure by advocating for the cultivation of inappropriate varieties.
3. Relatively few farmers were using the agrometeorological advisories (rates of use less than 20% of those in villages participating in the program) to inform their agricultural decisions.
4. In nearly all parts of southern Mali, women used the advisories at a lower rate than men, and often there was no participation in the program by women.
5. Those that used the advisories had the means (farm equipment, animal traction) to do so. Evidence from the preliminary assessment suggests that farmers using the advisories followed them closely with regard to variety selection and timing of planting, suggesting that the advisories are credible and useful for these farmers. Therefore, the low rates of use of the advisories appear to be related to farmers' ability to use the advisories, rather than their trust in the advisories' guidance.
6. There were also questions about the effectiveness of the means used to disseminate the advisories at the community level. Currently, trained farmer observers read village rain gauges and use these to interpret the advisories broadcast throughout southern Mali by radio and television. Conversations with farmer observers during the preliminary assessment, and the evidence of low rates of use of the advisories, suggest that this means of dissemination may not be adequate for reaching the widest possible suite of users.

The preliminary assessment suggested that the advisory program was not widely used or broadly impactful, it rarely served as a tool for women's agricultural activities, and it may suffer from issues of accuracy and data translation. However, this same assessment showed that those farmers who used the advisories followed them very closely. Clearly, that portion of the population with access to the advisories and the means to act on them found them very useful. This suggests that low rates of use were not principally a product of bad or unreliable advisories, placing the climate science challenges identified in the preliminary report in a different light. It seems that the low rates of advisory use are not tied to inaccuracies in the advisories themselves, as for at least some in the population they have the combination of credibility, salience, and legitimacy that makes them useful tools. However, it was not clear why the majority of this population did not make use of them to the same extent, or indeed at all.

## 2. THE GOAL OF THE CURRENT REPORT

This report builds on the preliminary report to explain the patterns that are described in points 3-6 above. It is not enough to identify low rates of use, or the near-absence of women, among end users of the advisories. To address such issues requires that we understand their causes. At the heart of the preliminary assessment was a clear contradiction: very low rates of use among those with access to the advisories, yet those using the advisories follow them very closely. Resolving this contradiction helps us to:

1. Understand the ways in which the advisories are currently useful, and how we might expand the reach of these aspects of the advisories
2. Identify the reasons behind the low rates of use seen across much of southern Mali, to enable the development of programming to address those issues
3. Identify information that end users want or need, but do not currently receive.

This report will provide the information needed to productively revise the existing advisories and their mode of delivery to maximize their impact, while pointing the way to new advisories that might speak to a wider set of users, or a wider set of user needs. By better targeting user needs, and ensuring we reach the widest range of possible users, we can design and implement climate services that address current vulnerabilities, while delivering a tool that users can employ to build their resilience to current climate variability and future climate change.

# 3. METHODS: HOW DID WE GATHER AND INTERPRET THE DATA IN THIS REPORT?

## **Methods Summary:**

- 1) The assessment used methods including desk studies, surveys, and semi-structured interviews to gather data.
- 2) The initial assessment covered a very large sample of communities and farmers across southern Mali
- 3) The current assessment focused on representative villages in the four livelihoods zones of southern Mali captured in the preliminary assessment
- 4) The current assessment was structured around the Livelihoods as Intimate Government (LIG) framework to allow for the systematic, rigorous interpretation of qualitative data

The methods used to gather and interpret the data in this report varied. The methods associated with the preliminary report are detailed there (Carr, 2014a). In summary, the preliminary assessment covered 33 villages in southern Mali, including some which currently or previously participated and others that had never participated in the program. These villages were divided into clusters that largely conformed to four livelihoods zones identified by FEWS-NET (Dixon and Holt, 2010): West and Central Rainfed Millet/Sorghum; South-west Maize, Sorghum, and Fruits; South Maize, Cotton, and Fruits; Sorghum, Millet, and Cotton (Figure 3.1). At the village level, field teams employed both focus groups and structured interviews to elicit residents' vulnerabilities and details of their livelihoods. Village populations were stratified by seniority and gender, following the literature on agricultural decision-making in southern Mali.<sup>2</sup> The result was 132 focus groups (four in each village, by gender/seniority cohorts) and 660 structured interviews across southern Mali. Because sample sizes were so small in each village (four focus groups,  $\approx$  20 interviews), the team used a strategy where interview samples partially overlapped focus group membership to cross-check for the representativeness of both focus groups and interviews. These results were further cross-checked with the literature on agriculture and livelihoods in southern Mali and local weather and climate data.

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<sup>2</sup> While the dominant ethnicities of the villages in which the preliminary assessment worked varied, including Bambara, Senoufo, and Malinke, the literature on agricultural livelihoods in all of these groups consistently identified gender and seniority as key identities shaping individual agricultural and livelihoods decision-making capacity.



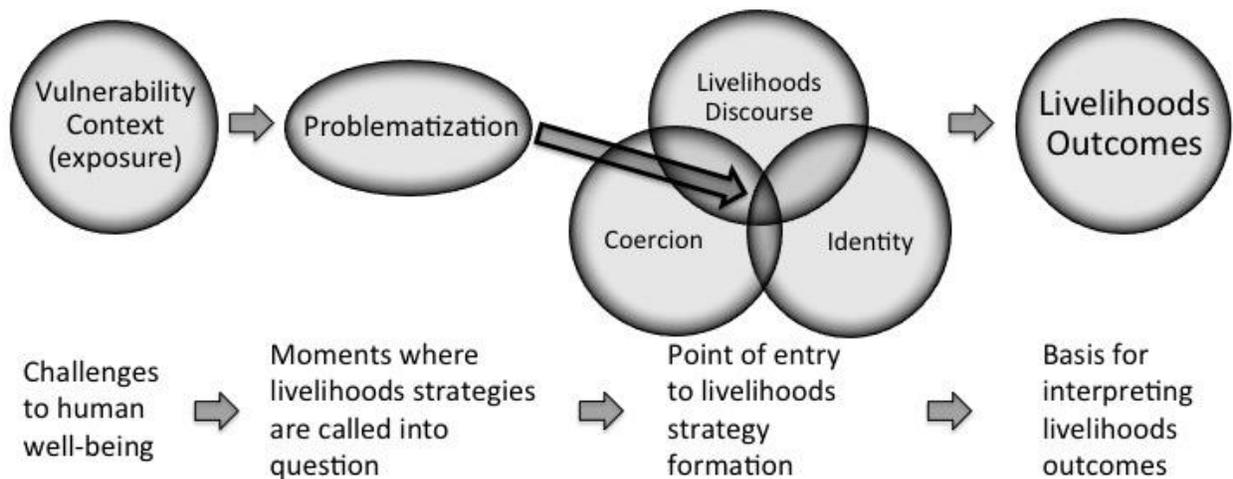
**Figure 3.1: Locations of Livelihoods Zones in southern Mali. This map builds on the work of FEWS-NET (Dixon and Holt, 2010), but represents the assessment’s understanding of the boundaries of these zones, including identifying regions where two zones shade into one another. Map credit: Christopher J. Witt, Department of Geography, University of South Carolina.**

To gather the data for this report, we selected one village from each of the four zones covered by the preliminary report. This village had to be participating in the program, and the agricultural practices, livelihoods, and vulnerabilities associated with its residents had to be representative of the larger zone to which they belonged. In each village, a single researcher or a team of two researchers took up residence for seven weeks, from the end of May through the middle of July, 2014. We timed this work to interview the residents of these villages about all of the significant agricultural decisions they would make for that season, and observe their livelihoods practices firsthand.

The fieldwork and subsequent analysis of the data were structured around the Livelihoods as Intimate Government (LIG) approach (Carr, 2014b, 2013). LIG approaches livelihoods as efforts to organize and make sense out of the world through the connection of three general arenas: *discourses of livelihoods*, which are the ways in which people speak about and act upon the world around them to make a living; *mobilization of identity*, where the livelihoods roles and responsibilities associated with a particular identity are used as a means of organizing these efforts and assigning activities to individuals; and *tools of coercion*, the means by which communities enforce conformity with the expectations encompassed in the discourses of livelihoods and mobilization of identity. This framing of livelihoods is useful here because

it recasts them as a means by which we might access decision-making structures through which individuals and communities apprehend and address the shocks and stressors to which they are exposed, the ways in which the different activities associated with different individuals produce different sensitivities to those shocks and stressors, and how discourses of livelihoods, expectations of identities, and tools of coercion shape different adaptive capacities. In short, rather than simply describe patterns of activity, we can explain these patterns.

As a field approach (Carr, 2014b), LIG begins with an understanding of the vulnerability context (Figure 3.2). In this case, the team drew on understandings of the vulnerability context of each livelihoods zone developed in the previous assessment, under a FEWS-NET livelihoods zoning exercise (Dixon and Holt, 2010), and existing weather and climate information. From this basic understanding, each team began by conducting semi-structured interviews with residents of the community in which they were living. These interviews established the livelihoods activities and perceived vulnerabilities of the residents. The team used purposive snowball sampling to identify interviewees, asking informants to identify other potential informants with similar livelihoods and vulnerabilities, keeping in mind the need to balance junior/senior respondents and men/women to ensure that the activities and vulnerabilities of those in all decision-making situations were captured. Interviews stopped when the field teams felt they had achieved saturation, a point where they were not identifying new questions to ask of residents, or hearing new answers to the questions they were asking. At this point, team members stepped back and looked at their data, classifying the residents of their communities into groups on the basis of shared livelihoods and vulnerabilities. While gender and seniority were often components of this classification, they were never completely determinant of group membership in any village.



**Figure 3.2: Schematic view of the LIG approach used for data collection and interpretation in the assessment (from Carr 2013b).**

Using these groups to stratify their samples, the teams moved to the second phase of field research. Here, the focus was on gaining entry to the interplay of livelihoods discourses, identity, and coercion that produced observed livelihoods decisions and outcomes (Figure 3.2). The point of entry that spurred all four teams' fieldwork during this phase was the contradiction that emerged in the preliminary assessment: why do roughly 20% of those living in a given community with access to the advisories use them religiously, while the other 80% seem to ignore them? The teams re-interviewed as many residents as possible within each group, and added new residents to the sample where possible. These new interviews were intended to capture residents' understandings of why particular livelihoods were suited to that

community, who those livelihoods activities were suited for, what characteristics were associated with men and women at different levels of seniority, and what happens to those who transgress the expectations of livelihoods or identity. As in the first phase of fieldwork, these interviews were semi-structured, and evolved as answers to initial questions directed lines of inquiry. This phase of fieldwork ended as the teams' time in the field ran out, though in most cases team members reported at least a degree of saturation for many of the topics under investigation. Both phases of fieldwork were complemented by data from participant observations, as the teams lived in the villages under investigation and therefore observed the activities of residents with regard to livelihoods decision-making, particularly the use of information to inform agricultural decision.

Data analysis began with the coding of the interviews from the field teams. Interviews were not recorded in the field, and so the field notes were the principal source of data for analysis. Three teams recorded their interview notes in French, and one in English. The French notes were translated into English either by translators paid by HURDL or by the HURDL staff who took the original field notes. All notes were imported into MAXQDA, a qualitative analysis support software. Once in MAXQDA, the notes were coded according to the LIG framework, under the broad headings of vulnerability context, discourses of livelihoods, identity, and tools of coercion – all with many sub-codes to represent specific types of answers. These codes were then used to retrieve data that was used to generate the numeric results presented for each village in Section 5 of this report, as well as supporting passages and quotes from field notes.

The analysis of this data followed LIG, much as did the fieldwork. The data was combed to build an understanding of the vulnerability context from the interview data, one independent of that of the field teams. This provided a useful cross-check on the perceptions of the field team, as at times the data suggested a consolidation of community sub-groups. For example, in the Danderesso case in this report (representative of livelihoods zone ML 10), initial fieldwork on the vulnerability context suggested there were five groups that required independent analysis. Subsequent data analysis after fieldwork collapsed these five groups into two on the basis of access to farming needs, and then re-stratified within those groups by seniority and gender to produce six sub-village groups for analysis. This analysis deepened the field teams' efforts to flesh out the vulnerability context, and served to validate/refine the stratification of the community into groups by vulnerabilities.

In each village, the contradiction from the preliminary report (low total number of users, but those using the advisories follow them closely) was revisited, examining who reported using the advisories. While in all villages the number of advisory users in the dataset is very low, mirroring the low rate of use in southern Mali, the patterns of use with regard to vulnerability groupings suggested strong connections between those with the equipment and animals that enable action on the advisories and the use of advisories.

Analysis then moved to the identities of the residents, and the roles and responsibilities associated with those identities. Then, we considered the discourses of livelihoods associated with the different activities reported by members of each community, weaving this into the identity data by considering *who* a particular activity was good or bad for, and why. Finally, we laid out the tools of coercion that serve as means of enforcing the expectations created by livelihoods discourses and the roles and responsibilities they mobilize for different individuals. In all cases, these discussions incorporated numeric data where appropriate, but generally focused on the interpretation of statements and interview notes. Interpretation addressed issues of rigor and validity by cross-checking claims with the claims of other informants, with other aspects of the interview data, with data from the preliminary report, and with external sources of information, such as those used to construct the initial understanding of the vulnerability context. This

triangulation of data and findings built a strong case for the interpretation of livelihoods decision-making and advisory use presented below.

What resulted from these efforts, as we present below, are different behavioral models for the different groups within each community we studied. These behavioral models help us to understand the decisions different individuals make (and why some get to make certain decisions, while others do not), the sorts of information they use to make those decisions, why they use that information, and where they get the information. All of this, in turn, helps to place the value of climate services into context within particular behavioral models, allowing for a robust interpretation of their utility to different community members. This produces two outcomes. First, we can interpret the patterns of use and non-use seen in the preliminary assessment, explaining the causes of these patterns. Second, in laying out these explanations, we can rigorously identify potential interventions that might broaden the utility and applicability of the advisory program to better meet the needs of a wider set of end users, thus enhancing its impact.

### **Findings Summary:**

- 1) The current assessment confirms both the low rates of use for advisories, and the limited engagement of women with the advisories, seen in the preliminary assessment
- 2) Rates of advisory use rise as one moves further east and south in Mali. The highest rates of use are among farmers who are located in relatively stable agroecologies in which annual precipitation and temperature variations are generally within manageable limits, and in livelihoods zones where the marketing of crops is a common activity.
- 3) There is limited engagement with this program among those farming in marginal environments where biophysical factors like limited annual precipitation or weak soils limit production
- 4) Access to livelihoods resources is perhaps the critical factor shaping overall engagement with the advisories. Those who own or have easy access to draught animals and farming equipment are generally more able to use advisories than those lacking one or both of these assets.
- 5) Within groups sharing levels of access to livelihoods resources, gender and seniority greatly shaped the intro-group patterns of advisory use.
- 6) Agricultural and other livelihoods decisions are more than just instrumental acts aimed at raising food or other resources. Instead, livelihoods are means of ordering and making sense of the world and the various people who live in it. They are very durable, and therefore altering the structure of agricultural decision-making in rural parts of southern Mali is not to be achieved via a technical intervention that modifies yields and agricultural techniques.
- 7) Climate services that aim to change livelihoods behaviors must identify opportunities for change that *emerge from the users*. In this report, we found that there were examples of individuals, often women, who managed to escape sanction despite behaving in a manner contrary to expectations. Such individuals, and such actions, are opportunities to identify indigenous pathways to change.

# 4. FINDINGS

The overarching findings of the assessment are reported in this section. Readers interested in the details of the analysis for particular livelihoods zones should consult the detailed discussions of data laid out in Section 5.

## 4.1. EXPLAINING THE PATTERNS OF ADVISORY USE

The preliminary report (Carr, 2014a) found very low rates of advisory use across Southern Mali (Figure 4.1). Further, the rates were generally highly gendered with women often reporting no use of the advisories at all. The 2014 data confirms this finding (Figure 4.2). The use of advisories is very clearly gendered in the new dataset. The new data also demonstrates that, as initially suspected, the rates of use in Zone ML09 were tremendously overstated in 2012. While the new findings reinforce our understanding of advisory use as both limited and highly gendered, the findings of this report better explain why the low rates of use, and their highly gendered character, exist and persist.

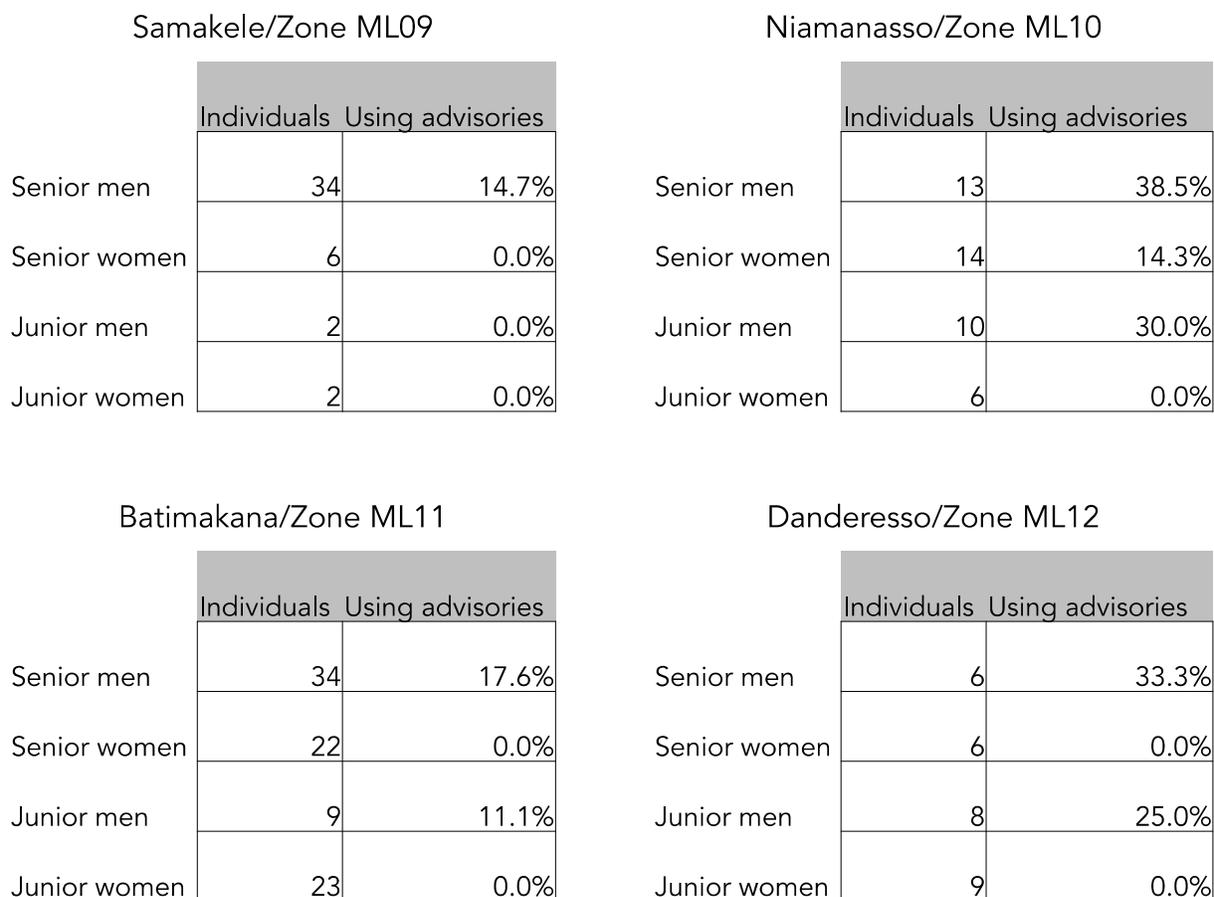
### Advisory Use in Villages Participating in the Program: 2012

Zone ML 09: "West and central rainfed millet/sorghum"				Zone ML 11: "South maize, cotton, and fruits"			
	Aware of program	Follow advice	% likely using		Aware of program	Follow advice	% likely using
Senior men	100.00%	80.00%	80.00%	Senior men	66.67%	46.67%	9.52%
Senior women	100.00%	0.00%	0.00%	Senior women	53.33%	33.33%	17.78%
Junior men	100.00%	80.00%	60.00%	Junior men	93.33%	60.00%	17.28%
Junior women	100.00%	0.00%	0.00%	Junior women	73.33%	33.33%	9.78%

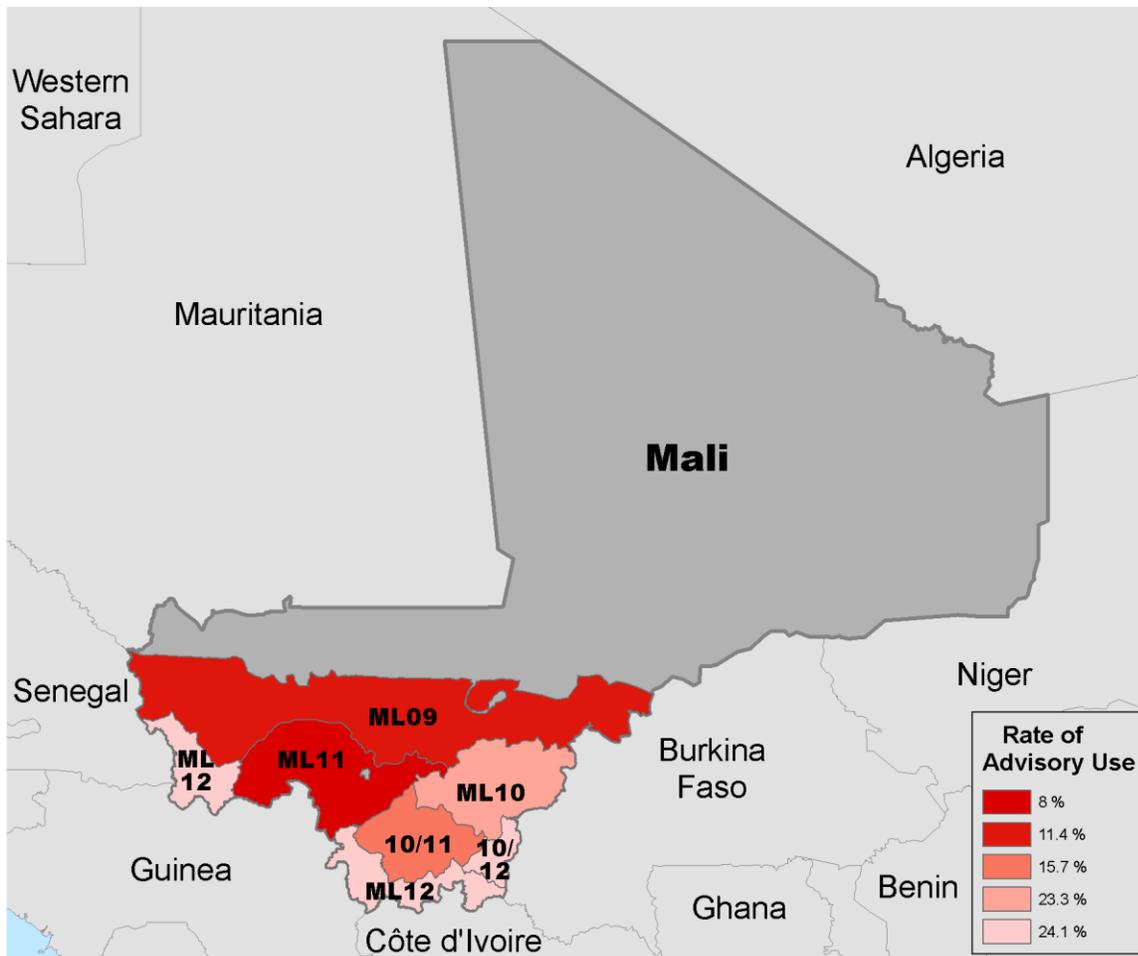
Zone ML 10: "Sorghum, millet, and cotton"				Zone ML 12: "South-west maize, sorghum and fruits"			
	Aware of program	Follow advice	% likely using		Aware of program	Follow advice	% likely using
Senior men	65.00%	45.00%	16.25%	Senior men	33.33%	33.33%	13.89%
Senior women	44.44%	11.11%	0.00%	Senior women	30.00%	0.00%	0.00%
Junior men	85.71%	80.95%	14.41%	Junior men	44.44%	22.22%	12.35%
Junior women	25.00%	25.00%	6.25%	Junior women	20.00%	10.00%	0.00%

**Figure 4.1: Rates of advisory use found in the 2012 preliminary assessment, by livelihoods zone (after Carr, 2014a)**



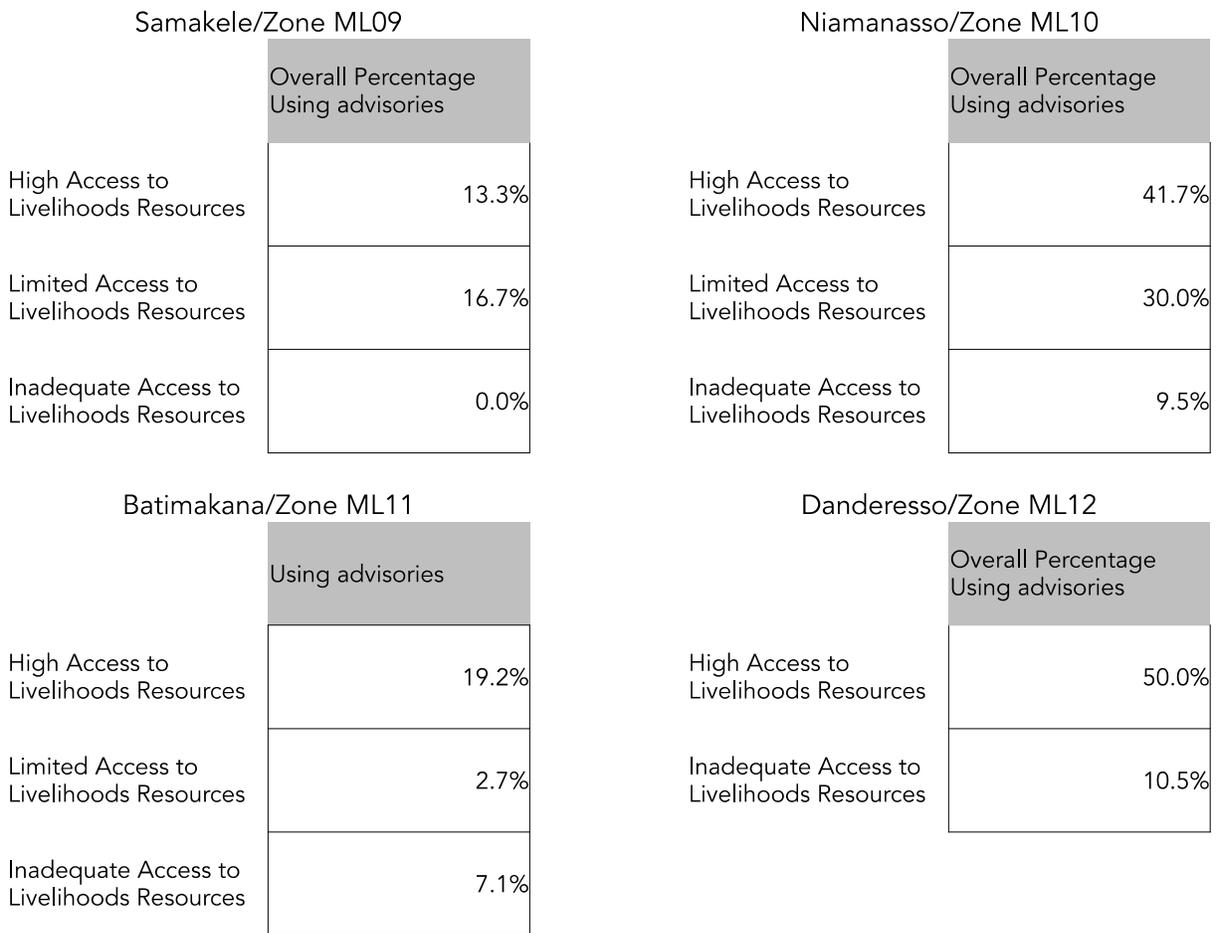
**Figure 4.2: Rates of advisory use found in the 2014 fieldwork, by sample village/livelihoods zone**

The first point that is clear from the data at hand is that rates of advisory use rise as we move east and south in Mali (Figure 4.3). In these zones (ML 10 and ML 12, as well as parts of the country where ML 10 and ML 12 blend with each other, and where ML 10 and ML 11 blend into each other), the agroecology is very favorable for rain-fed agriculture, and farmers are heavily engaged in marketing both staple and garden crops. Farmers in this part of Mali regularly cultivate all five crops for which there are advisories. In short, it appears that the advisory program works best for farmers who are located in relatively stable agroecologies in which annual precipitation and temperature variations are generally within manageable limits, and in livelihoods zones where the marketing of crops is a common activity. This program does not work best for those farming in marginal environments where biophysical factors like limited annual precipitation or weak soils limit production, and who we might assume are in the greatest need of advisories.



**Figure 4.3: Rates of advisory use across southern Mali, by livelihoods zone. Map credit: Christopher J. Witt, Department of Geography, University of South Carolina.**

Figure 4.4 illustrates the second major finding of this assessment. While it is clear that gender and seniority greatly shape individual’s capacities to use advisories, the clearest patterns of advisory use formed around the level of access individuals enjoy to livelihoods assets, particularly agricultural equipment and draught animals. This was not entirely true in Samakele, representative of the situation in Zone ML09. However, in Samakele and the rest of this zone, the composition of livelihoods changes the importance of advisories. Here, the wealthiest, most able individuals focus their livelihoods more and more on animal husbandry. Thus, those with the greatest livelihoods resources in this zone are somewhat less engaged in agriculture than those with fewer resources. Those with limited livelihoods resources are more engaged in agriculture as a means to raise food and capital to increase their animal holdings. They raise advisory-informed crops at greater rates than those with high access to livelihoods resources, and therefore find the advisories more useful. This is only true to a point, however, for below a minimum threshold of animal and equipment ownership, it becomes effectively impossible to use the advisories because the start of planting is so delayed. Thus, in Samakele, and in Zone ML 09 more broadly, those with inadequate access to livelihoods resources will not engage with the advisories at all.



**Figure 4.4: Rates of advisory use by degree of access to livelihoods resources, especially draught animals and agricultural equipment, drawn from the 2014 data. Those with high access to livelihoods resources generally own or have easy access to draught animals and farming equipment. Individuals with limited access to livelihoods resources generally own either animals or equipment, but face challenges obtaining the assets they lack. Those with inadequate access own neither draught animals nor agricultural equipment, and are very constrained in their agricultural and other activities. In Danderesso, those with limited access and inadequate access to livelihoods resources shared an assemblage of vulnerability, and were therefore collapsed for the purposes of analysis.**

While access to livelihoods resource is a principal determinant of advisory use throughout southern Mali, the identities that take shape at the intersection of seniority and gender play a very large role in both access to these resources, and to other factors that shape the utility of advisories. This is clearly articulated in the academic literature on each of the ethnicities that we engaged in the course of fieldwork for this report. The Bambara (who are the dominant ethnicity in ML 09, and present in ML 10, ML 12, and the eastern parts of ML 11) organize themselves via what Becker (1990, p.315) calls a patrilineal gerontocracy. Under this system, the most senior male member of a lineage or family, allocates land to the households of the men in that lineage. The men in these households then distribute this land for cultivation of different crops, with the cultivation of household grains receiving the highest priority (Grigsby, 2002). Under this system, Bambara women’s production is seen as secondary to men’s role as subsistence providers (Grigsby, 2004), and as a result women generally cannot own land, and must rely

on their husbands, other men in their lineage, or other lineages to provide them with land to cultivate (Akeredolu et al., 2007). Women of this ethnicity have insecure land tenure that prevents them from planting long-term tree crops or implementing other improvements to the land, and in extreme cases may motivate them to cultivate fast-maturing varieties to avoid the appropriation of their labor (Akeredolu et al., 2007; Grigsby, 1996). Concessions generally have communal farm equipment and granaries, though at times households within a concession might have their own granaries (Becker, 2000). Therefore, among the Bambara, senior men will have the greatest ability to act upon advisories, with junior men reliant on their approval because of their need to go through senior men to access land. Women will have little opportunity to make independent decisions about rain-fed agriculture, and may cultivate particular cycle lengths to address social challenges, like threats to their land tenure, rather than climatic challenges.

The Senoufo populations that dominate ML 10 and ML 12, and are found in parts of eastern ML 11, are organized in a very similar manner. Members of this ethnicity are organized into households of a man, his wives, and his children. These households are organized into a patrilineal extended family group headed by the most senior man (Skinner, 1959). As among the Bambara, the Senoufo organize agriculture around this social organization, with fields for the extended family group generally devoted to staple grains, personal or household fields for consumption and sale, cash crop fields, and fields for wet rice cultivation (Förster, 1998, p.106). The personal/household fields are largely viewed as supplements to the main fields for the extended family group (Förster, 1998, p.107). As with the Bambara, land passes through the most senior man through the male head of household to all other members of the extended family.

The Malinké, who are the dominant group in Batimakana, are a subgroup of the Mandinka people found in much of the western part of southern Mali, especially in the western part of Zone ML 11. Malinké social organization, like that of the Bambara and the Senoufo, is structured around a patrilineal gerontocracy. Under this organization, senior male heads of household designate communal household agricultural lands (usually dedicated to the cultivation of staple grains) and fields for individual household members (usually of lower fertility) (Assé and Lassoie, 2011, p.250). Gender relations in Malinké agriculture are a bit different from those seen among the Bambara or Senoufo, in that smaller households (i.e. a husband and wife) exhibit what Assé and Lassoie (2011, p.255) call “gender inclusive decision-making”, where men treat women as joint partners in agriculture. Larger polygamous households practice “gender exclusive decision-making” (Assé and Lassoie, 2011, p.255) where women are explicitly excluded from communal household agricultural decisions. Thus, as they mature and their households gain assets, women’s husbands will marry again and, as a result, these women will gradually lose decision-making authority in agriculture and the overall structure of Malinké agricultural decision-making will come to closely resemble that of Bambara or Senoufo agriculture.

These social structures create roles and responsibilities that are attached to particular identities. For example, senior men are the ones with the authority to make decisions about agricultural strategy. Further, in most settings they are the most likely to own the equipment and animals needed to respond to advisories in a timely manner. Thus, senior men are the most likely to be using advisories. Junior men in Bambara areas can, at times, own enough animals and equipment to follow the advisories, but generally do so only if the senior men in their families approve. In settings where agricultural production is organized by concessions and households (Zone 09, and to a more limited extent Zones 10 and 12), junior men must first work on concession land controlled by senior men, before turning to work on their own farms. As a result, their personal field preparation and planting is delayed, sometimes to the degree that there are few, if any, decisions (the timing of inputs, the selection of variety by cycle length) remaining that the advisories can productively inform, as the limited remaining season dictates, for example, the selection of short-cycle varieties to generate any harvest at all. Among the Malinké and

Senoufo, junior men may be less constrained by concession-level organization, though they would defer to senior men within their households. In general, junior men own fewer draught animals and less agricultural equipment than senior men, as they have had less time to accumulate the capital needed to purchase them. Thus, even in contexts where they are allowed to make their own decisions, junior men are less likely than senior men to have the resources necessary to respond to advisories.

The situation of women also varies by seniority, but less obviously. Generally speaking, women are expected to be obedient to both their husbands and other senior men, and to help with concession or household agricultural activities before undertaking any of their own work. Senior women have more of a leadership role in the household and concession (where appropriate), organizing domestic activities and generally ensuring domestic tranquility. Among the Bambara and Senoufo, their domestic authority, does not extend to livelihoods activities outside the house or compound. Generally speaking, women in these groups do not make rain-fed agricultural decisions such as crop/variety selection and the timing of agricultural activities. Such decisions rest with the men in their families. Instead, these women are expected to work on the concession and household farms, supporting their husbands. Only when this work is completed, or their labor is otherwise not needed, are senior women free to cultivate their own fields. Generally, senior women obtain land from their husbands, but control the majority of the proceeds from their farms and gardens. They are responsible for remitting a small, customary amount back to their husbands, but otherwise they have a general right to manage the profits from their agricultural labor. However, among the Malinké, junior women in monogamous households may share agricultural decision-making with their husbands, thus extending their authority and role to agriculture and key livelihoods decisions. Thus, a junior woman in monogamous Malinké household will likely have greater decision-making authority with regard to rain-fed agriculture than a senior woman in a Bambara or Senoufo household, or even a senior women in a polygamous Malinké household.

## **4.2. IMPROVING THE ADVISORIES: HOW FARMERS THINK**

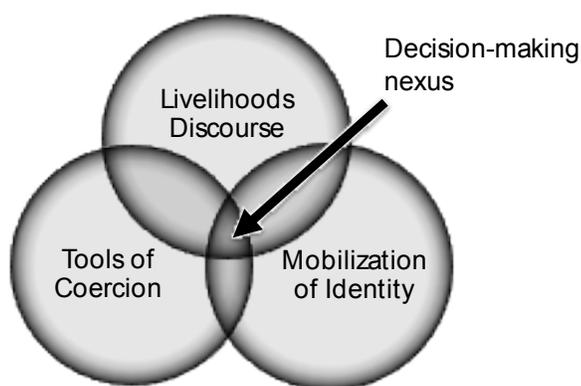
When evaluating the advisory program and its function, it is critical to remember that this program was not designed as a development intervention. As discussed in the preliminary report (Carr, 2014a), the agrometeorological advisory program was designed in the spirit of a humanitarian intervention in a time of crisis. It had a narrowly focused mission: to boost yields and alleviate the food security plaguing the country during the droughts and dry years of the late 1970s and early 1980s. As such, this program's bias toward senior men is not a design flaw. Instead, it speaks to the designers' deep understanding of social organization and agriculture in southern Mali. Senior men are generally those who make agricultural decisions for the rest of their families, especially in the context of the rain-fed grains that are much of the focus of the advisory program. Therefore, targeting these men and their activities with advisories was the most rapid and productive pathway through which to move weather and climate information into the decision-making structures of agriculture in southern Mali. Given the high level of uptake of this program among senior men with the means to follow advisories, it appears that in this regard the program was remarkably well-designed.

The challenge for the advisory program today is that, while it has been transitioned from a donor-funded project to a country-owned program (see discussion in Carr, 2014a), it has not been transitioned from a humanitarian assistance intervention into a development intervention. As a humanitarian intervention, the program was narrowly targeted at increasing agricultural productivity over the short term to address an acute stressor. There was no mandate to address gender or other forms of inequality, or the sustainability of livelihoods in the future, as neither of these directly impacted the project's defined goal. As an adaptation program aimed at building the resilience of rural agrarian livelihoods to likely impacts of climate variability and change, however, issues of inequality and sustainability move to the fore. Societies cannot maximize their resilience in the face of economic and environmental shocks and stresses, and cannot develop innovative adaptations to the pressures of climate change and global economic

change, if large portions of the population cannot express their needs, their capabilities, and their ideas and innovations. Further, activities that current achieve income, food security, or other livelihoods goals in the present may be predicated on activities that cannot be sustained by the local environment, or which may become non-viable due to future changes in the climate or environment.

Transitioning the Agrometeorological Advisory Program from its humanitarian intervention roots to an adaptation program with support for resilience programming requires understanding how a wide range of potential users might engage with weather and climate information in their livelihoods. This, in turn, requires understanding what decisions are being made in the rural, agrarian parts of southern Mali targeted by the program, who has the authority to make those decisions, and the basis on which those decisions are made. With this information in hand, it is possible to 1) understand how current advisories are used, and the degree to which they are effective in this role and 2) the sorts of information and advisories that are needed to reach a wider set of users, and a wider range of livelihoods activities, to support the complex web of livelihoods that produce resilient human outcomes.

Section 5 of this report explores these questions in great detail for each village and (by association) each livelihoods zone in southern Mali. Because structures of decision-making are specific to particular social and agroecological contexts, broad lessons about the design, implementation, and use of climate services from this data take shape at a more general level. At the most general level, we argue that the data from this study clearly reflects contemporary thinking on livelihoods and how individuals make livelihoods decisions (Carr, 2015). Specifically, livelihoods are not merely a means of making a living or meeting the material needs of everyday life. Instead, they are means of ordering the world and the people who live in it, assigning expectations and values to activities and individuals. This is a critical observation for climate services programs, as it means that the basis upon which different livelihoods decisions are made are often much wider and more complex than currently considered. As a result, those designing and implementing climate services often misunderstand the potential (or lack of potential) utility of a given service for a given population. The LIG framework (Carr, 2014b, 2013) used to structure the analysis in Section 5 captures this broader decision-making structure by examining how they take shape at the intersection of three locally-specific arenas (Figure 4.5):



**Figure 4.5: The conceptual core of the LIG approach**

- 1) The discourses of livelihoods: the activities people undertake in a particular place, their reasons for undertaking these activities, and their reasons for undertaking those activities in the manner they do. For example, the rationale for focusing on agriculture as the core of one's livelihoods (e.g. the local environment is conducive to the cultivation of staple grains, my father was a farmer and so am I), the goals of those activities (to feed the family, to earn income, to maintain or gain social status), and their reasons for how they undertake this activity (local agroecology rules out particular crops or animals, local market demand is focused on a single crop).
- 2) The ways livelihoods mobilize identity: individual identities are complex and mutable. Who any individual is socially depends heavily on the context. For example, a senior woman in many parts of southern Mali is a figure of considerable authority when addressing domestic needs within the family and household. However, in the context of rain-fed agricultural cultivation, these same senior women are subject to the authority and decisions of senior (and often junior) men and have little decision-making ability. Given the centrality of livelihoods activities to the everyday life in rural parts of southern Mali, it is not surprising that the general roles and responsibilities associated with individual identities tend to align strongly with the activities that they undertake. Senior men, who are expected to feed their families and provide for their needs, tend to engage in the cultivation of rain-fed staple grains that are principally used as a source of food. Cash cropping and other forms of livelihoods activity generally take a back seat to this subsistence goal, which not only meets a material need of each senior man's family, but also ensures that these men live up to the responsibilities associated with being a senior man in this part of the world. The alignment of livelihoods activities and practices with particular identities is so tightly interwoven that it makes these connections appear natural to those living in this context.
- 3) Tools of coercion: while the weaving of discourses of livelihoods and identity produce a coherent local story that rationalizes who conducts what activities and why, the outcomes of these patterns of activity and identity are uneven. Men generally have more decision-making power, control more resources, and can meet more of their personal needs than the women in their families. Senior men benefit from the labor of junior men, who must put aside the cultivation of their own fields until they have completed work on those of the concession and the senior men. In these and other cases, it is clear that at least some of those who are disadvantaged by the current structure of identity/livelihood would like different opportunities, more authority, or the opportunity to conduct different activities altogether. They do not, however, because the local weaving of identity/livelihood is policed by sanctions that are imposed upon those who do not conform to the roles and responsibilities associated with their identity, including specific livelihoods activities, means of conducting those activities, and goals for those activities. As is discussed at length below, a woman of any seniority who decided to disobey her husband and refuse to work on his fields, instead concentrating on her own garden and earning her own money which she spent on herself, would transgress such expectations. Such a woman would face a range of sanctions, from stern talking-to to beatings to the expulsion from the family and community. In most cases, these sanctions had not been used; that is, the "natural" relationship between identity and livelihoods in each community and livelihoods zone is very strong, so much so that most residents never think to question or challenge their place in this nexus, even if they dislike it.

Because livelihoods are means of ordering and making sense of the world and the various people who live in it, they are very durable. Altering the structure of agricultural decision-making in rural parts of southern Mali is not to be achieved via a technical intervention that modifies yields and agricultural techniques. It is, instead, a fundamental reworking of the world in which the farmer lives, and that farmer's place in the world.

### **4.3. IMPROVING THE ADVISORIES: WHO NEEDS WHAT INFORMATION?**

Given the durability of the livelihoods/identity nexus throughout southern Mali, the uptake of climate information by farmers will not be driven by the potential utility of the information alone. First, the utility of the information will vary within a community, sometimes having eight different types of utility (such as in Batimakana). Assessing the utility of the information from outside the context in which it will be used, and from outside the position of the different potential users in that place, ensures that the uptake and use of that information will be uneven and unlikely to produce broad-based impacts. For example, providing seasonal onset information will not be useful to all farmers in a given community, because only some of those farmers own the animals and equipment needed to start preparing their fields in response to this information. For the rest of the community, this information does little to inform their agricultural activities. Indeed, the provision of such information may enhance inequality within the community, as it enables the already-wealthy to improve their harvests without providing value to the less-wealthy.

Second, climate information is delivered into settings where individuals are basing their decisions on locally-specific decision criteria. The utility of any information is not gauged in a vacuum, but through livelihoods that provide a point of organization for local social relations, values, and the roles and responsibilities associated with different individuals. For example, it might be possible to deliver information on the duration of the season to women. Ostensibly, this information should be helpful to these women, who plant later in the season, as it would allow them to select varieties appropriate to whatever rainfall their fields will receive, and therefore maximize their yields. However, it may be that greater yields actually create problems for women. As seen in the case of Danderesso (section 5.2.2.1) below, women control the proceeds of their agricultural activities because those proceeds are generally seen by men as too small to be worth appropriating. If women's incomes from their agricultural activities were to increase, men might decide that this income is worth appropriating, leaving women without income. Thus, women in such a setting might not have any interest in or use for information on seasonal duration if such use risked the appropriation of *all* of their agricultural income.

In Section 5 below, we demonstrate how to approach and productively answer these questions. In so doing, we have identified the ways in which people are using advisories, and for those who are not using them, we can explain why not, and what information they might need. Section 4.5 summarizes these findings.

### **4.4. IMPROVING THE ADVISORIES: TRANSGRESSIONS AS OPPORTUNITIES**

Focusing on designing advisories in a manner that reflects the current capacities and desires of targeted users will likely improve uptake of the information they provide, providing quick, measurable impacts. However, the long-term value of advisories designed in this manner might have as development interventions – that is, as catalysts of change that lead to more resilience, security, and well-being – is unclear. Introducing any change into a society will have complex repercussions that are not easily anticipated, measured, or even recognized for some time. Certainly, delivering salient, credible, and legitimate weather and climate information may empower farmers in ways that neither we nor they can anticipate. In a world of increasing climate variability and change, the delivery of salient, credible, and legitimate information will play a transformative role in societies as they address emerging challenges in the anthropocene. At the same time, there is a significant risk that simply delivering information in a manner that aligns with current inequalities will reinforce or further those inequalities, improving opportunities for some while passing many others by.

An extensive critical literature outlines the ethical and practical issues around development interventions that are aimed at “behavior change” in particular populations. Such efforts raise important questions about who decides what behaviors need changing and why, and raise the specter of development as a new era of colonialism. Certainly, presuming that individuals want social change simply because roles, responsibilities, and outcomes do not conform to the values of donor societies has been demonstrated time and again to be ethically and practically problematic (e.g. Carr, 2008; Easterly, 2006; Ferguson, 1994; Grischow and McKnight, 2003; McKinnon, 2007; Mitchell, 2002; Nightingale, 2005; Rist, 2007; Tilley, 2011). In this regard, climate services are no different than any other development intervention. For example, the history of climate services for development is marked by a pronounced assumption, driven by climate scientists, that any information is better than no information (see reviews in Hansen, 2002; Tarhule and Lamb, 2003). This assumption has only recently been significantly challenged, largely through efforts to understand local decision-making and sources of climate information (e.g. Bishaw et al., 2013; Ingram et al., 2002; Leclerc et al., 2013; Orlove et al., 2010; Peterson et al., 2010; Roncoli et al., 2002, 2001a, 2001b; Silvestri et al., 2012; West et al., 2008). This literature demonstrates that farmers already have sources of climate information that speak to many of their information needs, and may have reasons for rejecting scientific climate information that are obviously logical regardless of one’s context (e.g. the climate service is less reliable than the local indicator of the phenomena in question – many farmers in southern Mali claim their local indicators of seasonal onset are more reliable than the advisories), or are logical from within the decision-making framework of the end user (e.g. women deciding not to maximize their production, lest it be appropriated by men in their household or extended family).

This does not mean that climate services must completely eschew the idea of behavior change as a goal of their implementation and use. Instead, designers of these services must identify opportunities for change that *emerge from the users*. If project designers seriously engage with the presumed users of the service, as we have in this report, it will quickly become apparent that not everyone is satisfied or happy with their roles and responsibilities, or the livelihoods outcomes with which they must live. Careful attention to the words of these marginal, disenfranchised, or perhaps just disgruntled members of the target population can point the way to opportunities to support indigenous transformation. For example, in the discussion of the tools of coercion in Batimakana (see Section 5.3.3), a single senior woman noted that while women were expected to be obedient and deferential to men, if a woman became powerful enough, she would not be sanctioned for abandoning these aspects of her role. This suggests two things: first, that there is space for women to transgress their often rigidly defined, enforced place in decision-making.

Second, at least one, and likely more women have successfully transgressed expectations of their gender and seniority. Such transgression suggests a desire to change roles, responsibilities and outcomes, and a pathway by which such changes might happen. Such a pathway could be explored with potential users to identify ways in which climate services could support such changes. By the same token, it is critical to be aware of situations where marginal or disadvantaged groups clearly do not want what might, from the perspective of a donor society, be an obvious change. For example, many senior women in Samakele argued that they did not want decision-making authority over agriculture or livelihoods decisions (see Section 5.4.1). One senior woman captured this sentiment when she said “I am no leader.” In the context of precipitation-challenged places like Samakele and Zone ML 09 more broadly, an effort to avoid decision-making authority is likely reflective of women’s observations of the strain that such decisions place on men. In this zone, as in other parts of southern Mali, men are expected to make wise decisions for their families. If they fail to do so on a consistent basis, they can be excluded from decision-making (effectively stripping them of their identities) or even expelled from the family. In such an environment, it is understandable that women might not want to take on the responsibilities and consequences associated with decision-making in this village and Zone.

The point here is that durable, meaningful social transformation is produced within societies, not imposed from outside these societies. Climate services can play an important role in catalyzing such changes, but only if these services can identify opportunities for change among specific groups within society, and identify means of supporting these groups in their efforts. This requires deep understandings of decision-making, social organization, and livelihoods such as are laid out for each village (and the zones they represent). Below, we summarize the opportunities and barriers to such catalytic roles for climate services.

## 4.5. SUMMARY FINDINGS BY ZONE

In each zone, the intersection of gender and seniority produces different roles and responsibilities, and therefore different expectations of decision-making with regard to livelihoods and agriculture. These decisions play out in the context of the livelihoods resources available to the individual in question. Therefore, understanding farmer decisions, and both current and potential advisory use, requires attention to the different situations faced by a range of different “farmer types” that are distinguished by their responsibilities for agricultural decision-making, and their capacity to act on advisories that might inform such decisions. In this assessment, we identified five farmer types in Danderesso, six in Niamanasso, eight in Batimakana, and five in Samakele. In each village, and therefore in each zone, there are types of farmers who can use the advisories (and often are), others who could use the advisories were basic constraints lifted, and still others for whom advisory use is very unlikely barring major changes in their material or social circumstances.

### 4.5.1. ZONE ML 12



With regard to the use of advisories, there are at least five different users in rural parts of Zone ML12 (Figure 4.6).

Senior men without animals and equipment
Junior men without animals and equipment
Women without animals and equipment
Senior men with animals and equipment
Junior men with animals and equipment

**Figure 4.6. Farmer types in Danderesso/Zone ML 12**

Below, we summarize each farmer type, their relative use of the advisories, and explain the factors that enable and constrain the use of advisories for those who fit into that farmer type.

- 4.5.1.1 Senior men without animals and equipment

Reasons to use advisories: feed the household, and where applicable, the concession; reinforce social status within household/concession/community

Barriers to use: Limited access to animals and equipment, limited access to human labor to replace animal labor

- 4.5.1.2 Junior men without animals and equipment

Reasons to use advisories: feed the household; produce marketable surpluses for income that builds assets and status

Barriers to use: Little authority over the timing or character of agricultural decisions; limited access to animals and equipment

- 4.5.1.3 Women without animals and equipment

Reasons to use advisories: Improve rice production and raise incomes

Barriers to use: Limited authority over agricultural decisions for crops with advisories; no rice advisories; rice production comes after helping on concession and household fields of other staple grains; at times rice production time is limited by domestic duties; surplus income and production is often appropriated by men in the concession or household

- 4.5.1.4 Senior men with animals and equipment

Reasons to use advisories: Feed the household or concession; make good agricultural decisions for the household and concession; improve yields and produce surpluses; use inputs effectively to minimize costs

Barriers to use: None

- 4.5.1.5 Junior men with animals and equipment

Reasons to use advisories: Feed the household; improve yields to produce greater marketable surpluses; use inputs effectively to minimize costs

Barriers to use: Very little agricultural decision-making authority; no advisories for vegetables and fruits about which they make decisions

The agroecology and market connectivity of Zone ML 12 present tremendous opportunities for the use of existing advisories, as agricultural production is relatively stable and adequate to meet food needs. Existing advisories clearly help some farmers boost yields to obtain marketable surpluses of staple crops. However, there are clear barriers to advisory use that explain the low rates of use in this zone.

- 1) Staple grains and cotton for which advisories are delivered are largely the purview of men, and even when they cultivate them women have little decision-making authority with regard to these crops.
- 2) The crops over which women do have control, such as hand-irrigated garden crops, do not benefit from current advisories.
- 3) The use of advisories generally requires the ability to respond to information early in the season, but the majority of households in this zone must wait to rent or borrow draught animals and/or farming equipment from those that own them. As a result, most households cannot use advisories until several weeks into the season, where seasonal length becomes a principal constraint on variety selection and crop prioritization.
- 4) Even in families where there are adequate animal and equipment resources to facilitate quick responses to advisories, junior men generally have to work the fields of the concession for senior men before turning to their own fields, thus limiting their ability to use the advisories.
- 5) In general, women and junior men are subject to the agricultural decisions of senior men, and therefore will not engage advisories unless through the decisions of senior men (on concession farms) or with the approval of senior men (on household farms).

There are several opportunities to expand advisory use in this zone, but these too come with attendant challenges:

- 1) Providing advisories for rice production would create an opportunity for women to engage with information in their own agricultural production. However, advisories for rice would encounter two immediate constraints that would have to be addressed in their design
  - a. Women only cultivate rice after working on concession and household rain-fed fields, and therefore will start cultivation late in the season. It is not clear that there will be enough time left in the season for advisories to be of help to these women
  - b. Women may be leery of advisories that incrementally increase their incomes, as this may only succeed in drawing attention to women's income and result in greater levels of appropriation of that income
- 2) Linking existing advisories to agricultural development projects that either directly provide animals and equipment, work on augmenting individual, household, and family asset bases, or provide credit that might be used to purchase needed animals and equipment would allow more farmers to respond to advisories, while at the same time potentially improving yields such that any debt or capital investment could be repaid rapidly.
  - a. The provision of such programs falls outside the purview of climate service providers, and will require coordination with appropriate ministries and donors.
- 3) Enhancing existing advisories that provide crop-specific information on overall production and market conditions in the zone and in the country as a whole (both rain-fed and irrigated garden crops), for example by updating that information more frequently than the current 10-day advisory cycle, and by providing information about more market and more crops, would allow farmers to better plan their agricultural investments, including crop selection and timing.
  - a. As with rice advisories, women might not take up such advisories for their garden crops as it could boost incomes into a range where men decide to appropriate more.

## 4.5.2. ZONE ML 10



With regard to advisory use, there are six different farmer types in Zone ML10 (Figure 4.7).

Men with High Livelihoods Resource Access
Men with Limited Livelihoods Resource Access
Women with Limited Livelihoods Resource Access
Senior men with Inadequate Livelihoods Resource Access
Senior women with Inadequate Livelihoods Resource Access
Junior women with Inadequate Livelihoods Resource Access

**Figure 4.7. Farmer types in Niemanasso/Zone ML 10**

Below, we summarize each farmer type, their relative use of the advisories, and explain the factors that enable and constrain the use of advisories for those who fit into that farmer type.

- 4.5.2.1 Men with High Livelihoods Resource Access<sup>3</sup>

Reasons to use advisories: Improve crop yields to increase marketable surpluses of staple crops

Barriers to use: These men have few, if any, barriers to advisory use

The principal reason for these men to use advisories is to improve their already-strong livelihoods and social status in the community. These men have had success without the advisories, which appears to create a belief in their own indicators that trumps any information provided by the advisories. For example, on junior man (Interview #10) noted that he applied fertilizer to his fields after the rains had started, but he did not use the rain gauge to figure out if there was enough rain for this activity. Instead, he digs into the soil in his fields to evaluate the depth and degree of soil moisture, and uses his personal experience to evaluate the state of his fields from this indicator. It may be that soil moisture is an adequate indicator for planting and the timing of inputs, and these men have little use for the additional information when it comes to planting or the application of inputs. However, indicators like soil

<sup>3</sup> In this report, those with high livelihoods resource access either own or have no barriers to the use of animal traction and farm equipment necessary to conduct agricultural activities.

moisture do not provide information about the likely length or quality of the season, and therefore it is possible that advisories might help these men better select varieties that will suit the upcoming season.

- 4.5.2.2 Men with Limited Livelihoods Resource Access

Reasons to use advisories: Make variety selections that maximize production; ensure the food security of the household; improve the material status of the household with regard to livelihoods and other assets; ensure their own social position as decision-makers and providers for the family

Barriers to use: Limited access to animals and equipment can result in situations where these men cannot respond to advisories in a timely manner; limited access to animals and equipment can force these men to prioritize crops, limiting the utility of advisories for staple grains that are planted late in the season; junior men have limited independent agricultural decision making, making them dependent on the senior men in their families for variety selections and the timing of agricultural activities

These men face several barriers to their efficient use of advisories, including delays in their ability to respond to advisories brought on by the need to wait for agricultural assets before field preparation can begin. Further these men are doing reasonably well without this information, which gives them little incentive to pay attention to this new source of information.

- 4.5.2.3 Women\* with Limited Livelihoods Resource Access

Reasons to use advisories: Better employ limited labor capacity and access to agricultural equipment and animals to maximize production; use their very limited access to inputs in the most efficient way possible; produce marketable yields, the profits from which can be reinvested in the household, agriculture, or gardening to secure their material well-being and that of their households

Barriers to use: No draught animals or equipment, making it extremely difficult to respond to advisories in a timely manner; unless a widow, these women do not make agricultural decisions of their own; local indicators of soil moisture might be adequate for appropriately timing the use of inputs.

Among these women, advisories could most easily target the needs of widows, who at least control most of their own agricultural decisions and may have access to some or all of the assets they need to farm in a timely manner. Married women in this group face significant constraints to their agricultural production, and are not planting enough staple grain of their own to become greatly invested in new sources of information that impact these crops.

\*while no junior women were identified as part of this group in the 2014 sample, it is likely that such women do live under these circumstances and face similar constraints to those of senior women with limited access to livelihoods resources

- 4.5.2.4 Senior men with Inadequate Livelihoods Resource Access

Reasons to use advisories: Ensure the food and material security of their families; meet their responsibilities to feed and provide for their families; meet their responsibility to provide wise agricultural advice to their families; improve the efficiency of input use to maximize this scarce resource; create marketable surpluses of staple crops that might generate capital for reinvestment in agricultural production.

Barriers to use: No access to draught animals, and little or no access to agricultural equipment, prevents these men from responding to advisories in a timely manner; limited ability to cultivate constrains the size of the farms they work, and the number of staple grains they can farm; limited access to agricultural

resources forces these men to triage their agricultural production, planting some less-important staple grains late in the season when advisories provide little useful information.

Length of season is a significant stressor for these men, and advisories that provided updated, reliable information on the expected length of the season and the distribution of precipitation in the season could inform their very delayed planting. More importantly, these men would be acutely aware of the value of this information, even if they must plant so late that the information is not useful for them. Finally, these men are not terribly successful at the moment, which may lead them to show interest in advisories as a means to improve their livelihoods outcomes.

- 4.5.2.5 Senior women with Inadequate Livelihoods Resource Access

Reasons to use advisories: Improve their limited staple grain production to generate marketable surpluses

Barriers to use: Very little independent rain-fed agricultural decision-making; no access to draught animals, and little or no access to agricultural equipment limits their ability to respond to advisories; labor expectations de-prioritize women's production, forcing their planting late into the season where advisories provide little useful information

These women have very little incentive to use or pay attention to advisories. They earn income principally through gardening, and this is an activity over which they have more control.

- 4.5.2.6 Junior women with Inadequate Livelihoods Resource Access

Reasons to use advisories: Improve peanut production to generate marketable surpluses that might finance increased gardening or non-farm activities

Barriers to use: Very little independent rain-fed agricultural decision-making; the timing of their access to draught animals and agricultural equipment is shaped by social values that de-prioritize women's production, forcing their planting late into the season where advisories provide little useful information

Zone ML 10, like Zone ML 12, exhibits the agroecology and market connectivity necessary to make the wide use of existing advisories possible. However, there are several barriers to advisory use in this zone that prevent their uptake by the majority of the population.

- 1) The current success experienced by farmers with high access to livelihoods resources appears to limit their interest in advisories. Their current use of local soil moisture indicators clearly works to inform their planting and input decisions right now, and because they can plant early in the season, they are not particularly concerned about seasonal length. Therefore, they do not see the advisories as providing additional information beyond what they already have. It is not likely that this group of farmers will engage heavily with the advisories until conditions in this zone change such that they become concerned about the length of the season.
- 2) Men with limited access to livelihoods resources face two barriers to use. First, they must wait until their counterparts with animals and equipment have finished field preparation and planting before they can start preparing their own fields, reducing the effective length of the season and therefore the efficacy of early-season advisories for these men. Second, when the season is compressed in this zone, men have to prioritize crops that are more or less likely to succeed, and right now they de-prioritize crops like maize, further limiting the utility of some advisories.
- 3) Men with inadequate access to livelihoods resources face acute versions of the constraints faced by men with limited access to livelihoods resources, and are therefore even more constrained in their ability to engage advisories.

- 4) Women with limited access to livelihoods resources do cultivate some rain-fed crops, but do so only after they have helped their husbands with concession and household-level farm work. Therefore, their effective agricultural seasons are extremely short, likely forcing them to select short-cycle varieties regardless of advisory data. Further, in the context of rain-fed agriculture, these women are generally subject to the agricultural decision-making of the men in their families, and therefore may find themselves barred from advisory use by their husbands or other senior men who do not trust or find them useful.
- 5) Women with inadequate access to livelihoods resources suffer from more acute versions of the barriers to advisory use seen among women with limited access to livelihoods resources. Junior women with inadequate access to livelihoods resources may disengage from advisories entirely, as for them gardening is clearly a more lucrative, successful activity than rain-fed agriculture.

Despite the barriers to advisory use seen in this zone, there are significant opportunities to boost advisory use as well:

- 1) For men with limited livelihoods resources, and to a lesser extent men with inadequate livelihoods resources, the fact they must engage in agricultural triage with regard to crop selection presents an opportunity for advisories. Continuously updated advisories that could speak not only to appropriate cycles, but appropriate crops given the likely remaining character of the season, could significantly help these men plan their agricultural activities to maximize yields and possibly allow for the production of a marketable surplus.
  - a. Such advisories will do little for most women in these groups, as they will still commence field preparation so late in the season that even these advisories will likely be of little use.
- 2) To empower both men and women with limited or inadequate livelihoods resources to use the advisories, the program should engage with agricultural development projects that either directly provide animals and equipment, work on augmenting individual, household, and family asset bases, or provide credit that might be used to purchase needed animals and equipment would allow more farmers to respond to advisories, while at the same time potentially improving yields such that any debt or capital investment could be repaid rapidly.
  - a. The provision of such programs falls outside the purview of climate service providers, and will require coordination with appropriate ministries and donors.
- 3) Women are likely to be best engaged through advisories that provide crop-specific information on production within Mali and surrounding countries, and market conditions in the zone and in the country for irrigated garden crops. This would allow women to better plan their agricultural investments, including crop selection and timing.
  - a. Women might not take up such advisories for their garden crops as it could boost incomes into a range where men decide to appropriate more.

### 4.5.3. ZONE ML 11



In terms of the relevance of agrometeorological advisories and the amelioration of livelihoods challenges related to climate variability and change, there appear to be eight types of different farmers in Batimakana (Figure 4.8). In both the High Livelihoods Resource group and the Limited Livelihoods Resource group, there are very few differences between the activities, crop selections, crop uses, and even stated vulnerabilities of junior and senior women. While these women do have different roles and responsibilities in the community and in their households, these do not appear to extend to the sorts of decisions and outcomes impacted directly by advisories. Junior and senior women in the Inadequate Livelihoods Resource group, who did not have access to equipment, labor, and animals, had distinct characteristics that made them worth grouping separately. We have included a category for junior man with access to animals, equipment, and labor in the table, but we cannot discuss this category here or in the discussion below as we did not interview anyone in this group.

Men with high access to livelihoods resources
Women with high access to livelihoods resources
Men with limited access to livelihoods resources
Women with limited access to livelihoods resources
Senior men with inadequate access to livelihoods resources
Junior men with inadequate access to livelihoods resources *
Senior women with inadequate access to livelihoods resources
Junior women with inadequate access to livelihoods resources

**Figure 4.8. Farmer types in Batimakana/Zone ML 11**

\*group is inferred from the 2012 data, as fieldwork did not capture any junior men in this situation

Below, we summarize each farmer type, their relative use of the advisories, and explain the factors that enable and constrain the use of advisories for those who fit into that farmer type.

- 4.5.3.1 Men with high access to livelihoods resources

Reasons to use advisories: Increase yields and surpluses, make good agricultural decisions for the rest of the family, reinforce social status as provider of food and grain for the household, use inputs effectively

Barriers to use: Poor agroecology may limit utility of some grains (i.e. millet), cotton variety selection does not appear to be determined by farmers

- 4.5.3.2 Women with high access to livelihoods resources

Reasons to use advisories: To improve peanut yields and secure the food supply of the household while producing a marketable surplus that provides cash income for the household

Barriers to use: Women do not cultivate any other advisory crops – and there are no market garden specific advisories that might impact decision-making for irrigated crops.

- 4.5.3.3 Men with limited access to livelihoods resources

Reasons to use advisories: Boost yields to ensure adequate grain production and food security for the household and family, ensure they meet their responsibilities for food production, purchase needed agricultural assets (equipment, animals) that will facilitate greater production, income, food security, and status security.

Barriers to use: Limited access to animals and equipment limits the number of crops and the size of area under cultivation, limited access to labor does not allow them to compensate for inadequate animals and equipment.

- 4.5.3.4 Women with limited access to livelihoods resources

Reasons to use advisories: Boost yields of peanuts, provide both more food and more money to the household, meet the subsistence needs of the household

Barriers to use: Very little authority to make agricultural decisions about the preparation and planting of peanuts, little control over the timing of peanut planting (as it comes after the planting of men's crops), all other crops tend to be market garden crops that are irrigated and for which there are no advisories; however, it is important to note that some junior women in monogamous households might have a great deal of input into agricultural and livelihoods decisions, and therefore might be empowered to use the advisories to the extent allowed by their household resources.

- 4.5.3.5 Senior men with inadequate access to livelihoods resources

Reasons to use advisories: Boost yields to ensure adequate grain production and food security for the household and family, ensure they meet their responsibilities for food production, reinforce/build social status in household, concession, and family.

Barriers to use: Without access to equipment and animals, these men have to wait to prepare and sow their fields until those who own equipment and animals have finished. This greatly delays their agricultural activities, making early season advisories largely useless. Agroecological challenges make the cultivation of staple grains beyond sorghum challenging, and therefore these men will likely only have

use for sorghum advisories, and only sorghum advisories that still provide useful information late in the season.

- 4.5.3.6 Senior women with inadequate access to livelihoods resources

Reasons to use advisories: Boost yields of peanuts, provide both more food and more money to the household, meet the subsistence needs of the household

Barriers to use: Very little authority to make agricultural decisions about the preparation and planting of peanuts, little control over the timing of peanut planting (as it comes after the planting of men's crops), all other crops tend to be market garden crops that are irrigated and for which there are no advisories

- 4.5.3.7 Junior women with inadequate access to livelihoods resources

Reasons to use advisories: Boost yields of peanuts, provide both more food and more money to the household, meet the subsistence needs of the household, increase market engagement and income

Barriers to use: Very little authority to make agricultural decisions about the preparation and planting of peanuts; little control over the timing of peanut planting (as it comes after the planting of men's crops); all other crops tend to be market garden crops that are irrigated and for which there are no advisories; however, it is important to note that some junior women in monogamous households might have a great deal of input into agricultural and livelihoods decisions, and therefore might be empowered to use the advisories to the extent allowed by their household resources.

There are several barriers to the use of advisories that explain the relatively low rate of engagement with advisory data by residents of Batimakana, and Zone ML 11 more broadly:

- 1) The agroecology of Zone ML 11 is more limiting than that seen in zones ML 12 or ML 10. Crops like maize and millet do not grow as readily in this zone, constraining their cultivation, and therefore the utility of maize and millet advisories. This problem becomes more acute as men's access to livelihoods resources is reduced, with those living with inadequate livelihoods resources only able to cultivate sorghum. The restriction of cultivation to a single rain-fed crop, and the delay of field preparation and planting until late in the season makes advisories less and less useful to men with less access to livelihoods resources like animals and equipment
- 2) The rain-fed cultivation of women of all resource access levels is largely limited to peanuts. Further, these women only cultivate their own farms after working on those of their families. As a result, even those with access to animals and equipment cannot prepare their peanut fields early in the season, and therefore cannot take full advantage of advisories. Women with limited and inadequate access to animals and equipment experience this challenge much more acutely, such that they are often planting so late in the season that advisories cannot inform any decisions, such as cycle length.

The agroecology of Zone ML 11, when combined with the roles and responsibilities that define who grows what, produces distinct challenges for advisory use. It also limits the opportunities to deliver information that could benefit a wider portion of the population. For example, there is little purpose in an advisory that helps with late-season crop selection, as the agroecology of ML 11 does not allow for the cultivation of second- and third-choice crops without a great deal of inputs. Therefore, those who would need this information, the farmers with less access to needed livelihoods resources, would not be able to act on these advisories as they would not have the inputs needed to select crops other than sorghum. There are, however, some options for expanding advisory use and impact:

- 1) Women, especially junior women, are likely to be best engaged through advisories that provide crop-specific information on overall production and market conditions in the zone and in the country for irrigated garden crops). This would allow women to better plan their agricultural investments, including crop selection and timing.
  - a. Women might not take up such advisories for their garden crops as it could boost incomes into a range where men decide to appropriate more.
- 2) Junior women in monogamous households with high and limited access to livelihoods resources may have a great deal of decision-making power shared with their husbands, and could be engaged with advisories to shape the decision-making of their households.
  - a. Such decision-making must still conform to the expectations of senior men in the extended family to which they belong.
  - b. These opportunities could pass quickly, as a successful household will accumulate the resources needed to allow the husband to take a second wife. In general, polygamous household exhibit very little shared livelihoods or agricultural decision-making among the genders.
- 3) To empower both men and women with limited or inadequate livelihoods resources to use the advisories, the program should engage with agricultural development projects that either directly provide animals and equipment, work on augmenting individual, household, and family asset bases, or provide credit that might be used to purchase needed animals and equipment would allow more farmers to respond to advisories, while at the same time potentially improving yields such that any debt or capital investment could be repaid rapidly.
  - a. The provision of such programs falls outside the purview of climate service providers, and will require coordination with appropriate ministries and donors.
- 4) If #2 is realized, it is possible that advisories that produce more informed agricultural triage with regard to crop selection might become useful. If farmers in this zone have access to inputs, they might be able to use continuously updated advisories that could speak not only to appropriate cycles, but appropriate crops given the likely remaining character of the season, to plan their agricultural activities to maximize yields and possibly allow for the production of a marketable surplus.
  - a. In the absence of #2 above, however, such advisories would be of no value to the farmers in ML 11.

#### 4.5.4. ZONE ML 09



With regard to advisories and their use, the 2014 fieldwork identified five types of farmer in Samakele and Zone ML 09 (Figure 4.9). All but one of these groups was present in the 2014 sample. We can infer the existence of junior women with high livelihoods access from the 2012 data, specifically the very high rate of sesame production recorded by junior women in that sample. As the cultivation of sesame requires adequate, stable access to land, it is likely that the high rate of cultivation is linked to their access to livelihoods resources. This same dataset also suggests that the one senior woman identified in this group is not an outlier, but instead is representative of other women sharing her situation. It is not clear if there are women in this village who belong to the limited livelihoods resource group. They were not captured in the 2014 sample, and the 2012 data does not provide enough disaggregated data to allow for the inference of their presence.

Senior men with high livelihoods resource access
Senior women with high livelihoods resource access
Men with limited livelihoods resource access
Men with inadequate livelihoods resource access
Women with inadequate livelihoods resource access

**Figure 4.9. Farmer Types in Samakele/Zone ML 09**

Below, we summarize each farmer type, their relative use of the advisories, and explain the factors that enable and constrain the use of advisories for those who fit into that farmer type.

- 4.5.4.1 Senior men with good livelihoods resource access

Reasons to use advisories: Secure grain yields to ensure status within household, concession, and community; ensure food security of the household; build assets within the household

Barriers to use: The agroecology of zone ML09 is too arid to allow for the effective cultivation of maize and cotton without very significant investments in inputs and possibly irrigation; advisory crops are those that senior men are least likely to take risks with as they ensure food and status security; advisories do not speak to the local cash crops sesame and henna

- 4.5.4.2 Senior women with good livelihoods resource access

Reasons to use advisories: Boost peanut production for food and income; build animal assets and support household needs with income

Barriers to use: Little autonomous decision-making authority: the only crop women cultivate for which there is an advisory are peanuts - advisories otherwise target “men’s” crops like millet and sorghum; there are no advisories that speak to gardened crops.

- 4.5.4.3 Men with limited livelihoods resource access

Reasons to use advisories: Boost production of staple grains to allow for marketable surpluses that facilitate investment in missing agricultural equipment and better land; improve personal social standing in the family and community by providing more food/grain; improve food security of the household through increased yields and income.

Barriers to use: Incomplete agricultural equipment limits their ability to respond to advisories; incomplete equipment means that they cannot cultivate many crops at once, forcing prioritization of more robust crops; local agroecology limits the viability of maize, moving its viability and importance below other grains and cash crops and making maize-related advisories largely useless.

- 4.5.4.4 Men with inadequate livelihoods resource access

Reasons to use advisories: Boost production of staple grains to ensure food security of the household and concession; ensure status within family, concession, and community; allow for a marketable surplus of staple grains that can be used to build up livelihoods resources; diversification of grain production to hedge against different market and environmental shocks.

Barriers to use: Extremely limited access to animals and equipment make responding to advisories effectively impossible; limited labor and land access greatly constrain the range of crops cultivated

- 4.5.4.5 Women with inadequate livelihoods resource access

Reasons to use advisories: Boost peanut production to generate larger surplus production; enable cultivation of sorghum and other grains that can generate both food and income; generate income that could be invested in ruminants as well as fowl

Barriers to use: Little autonomous decision-making with regard to agriculture; cultivation is focused on only one advisory-informed crop; no access to animals or equipment to facilitate increased or more timely production

Zone ML 09 is the most arid and challenging for sedentary agriculture of any covered by the agrometeorological advisory program. The agroecology presents significant challenges for the use of advisories, as do the discourses of livelihoods at play in the zone.

- 1) Men with high access to livelihoods resources generally invest those resources in cattle, instead of further improving/expanding agricultural production. Therefore, while these men are the most able to use advisories throughout the agricultural season, they are not always heavily engaged in agricultural production. As livestock husbandry is seen as a very desirable livelihood in this zone (and, ecologically speaking, may be a more viable livelihood than sedentary agriculture), it is unlikely that those with the resources to fully utilize advisories will do so.
- 2) The agroecology of Zone ML 09 all but rules out the cultivation of maize unless the farmer has access to irrigation. Therefore, maize advisories are of little use to the farmers in this zone.

- 3) The rain-fed agricultural production of women in this zone is constrained to peanut cultivation. However, the preparation and cultivation of peanut fields comes after women have worked on concession and household farms, and therefore is greatly delayed. These delays are more acute for women living in concessions and households with less access to livelihoods resources. Therefore, for most women the window for peanut cultivation is so late in the season, and the local environment so precipitation-challenged, that they are forced to plant short-cycle varieties and the advisories provide no useful information.

While this Zone presents significant challenges to advisory use, it also presents some unique opportunities to think about new or different advisories that might be taken up and benefit the livelihoods of those living in this zone.

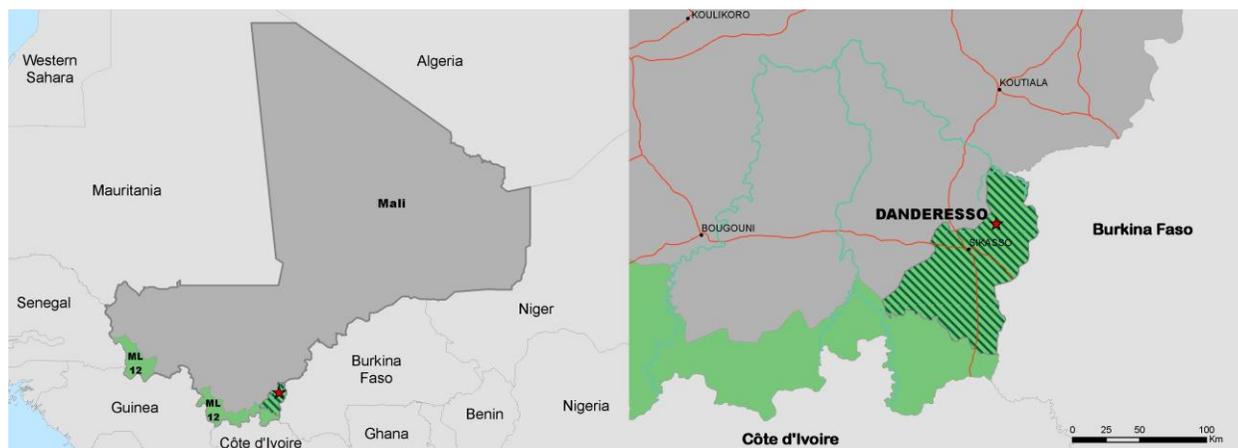
- 1) The importance of livestock, especially cattle, to the livelihoods of those in this zone suggest that fodder-related advisories would be of use to many in this zone. The current advisories already discuss fodder conditions, but do so as real-time reporting, not predictions of future fodder conditions that might inform herd movements or livestock management strategies.
  - a. Such advisories would most benefit the wealthy in this Zone, and could therefore contribute to a widening gap between the wealthy and the poor
- 2) Men with limited livelihoods resources are trying to acquire the animals they need to build a significant animal husbandry component to their livelihoods. They are building up these resources through the profits from agriculture, and therefore seek marketable surpluses of their crops. They are the group most likely to be using advisories right now, and could expand use rapidly if they had greater access to agricultural equipment, such as plows (generally, they have access to animal traction).
  - a. The provision of such equipment falls outside the purview of climate service providers, and will require coordination with appropriate ministries and donors.

# 5. LIVELIHOODS DECISION- MAKING AND ADVISORY USE IN SOUTHERN MALI

Each of the village analyses below begins with a review of the preliminary report data with regard to advisory use and an overview of the 2014 data to demonstrate the degree to which the cases below are representative of the larger zones, which they are being used to interpret. We then lay out a detailed analysis of each village's data, following the LIG approach. Each village section builds a behavioral model for the different groups within each village, laying out how existing advisories speak to their decisions. Where possible, each section identifies how to enable greater use of existing advisories by community members, and identifies other sources of information that might be provided as advisories to reach the specific needs and decisions of these groups.

## 5.1. DANDERESSO/ZONE ML 12

Danderesso is the primary town of the rural commune of Danderesso, in the Sikasso Cercle of the Sikasso Region of southeast Mali (Figure 5.1.1). Located roughly 30km northeast of the city of Sikasso, this community was chosen for its representativeness of Cluster 2, livelihoods zone ML12: “South-west maize, sorghum, and fruits”<sup>4</sup>. According to the 2009 census, Danderesso was home to 3396 people (1692 men, 1704 women), averaging six people per household and 2.3 households per concession (Republique du Mali, 2009).

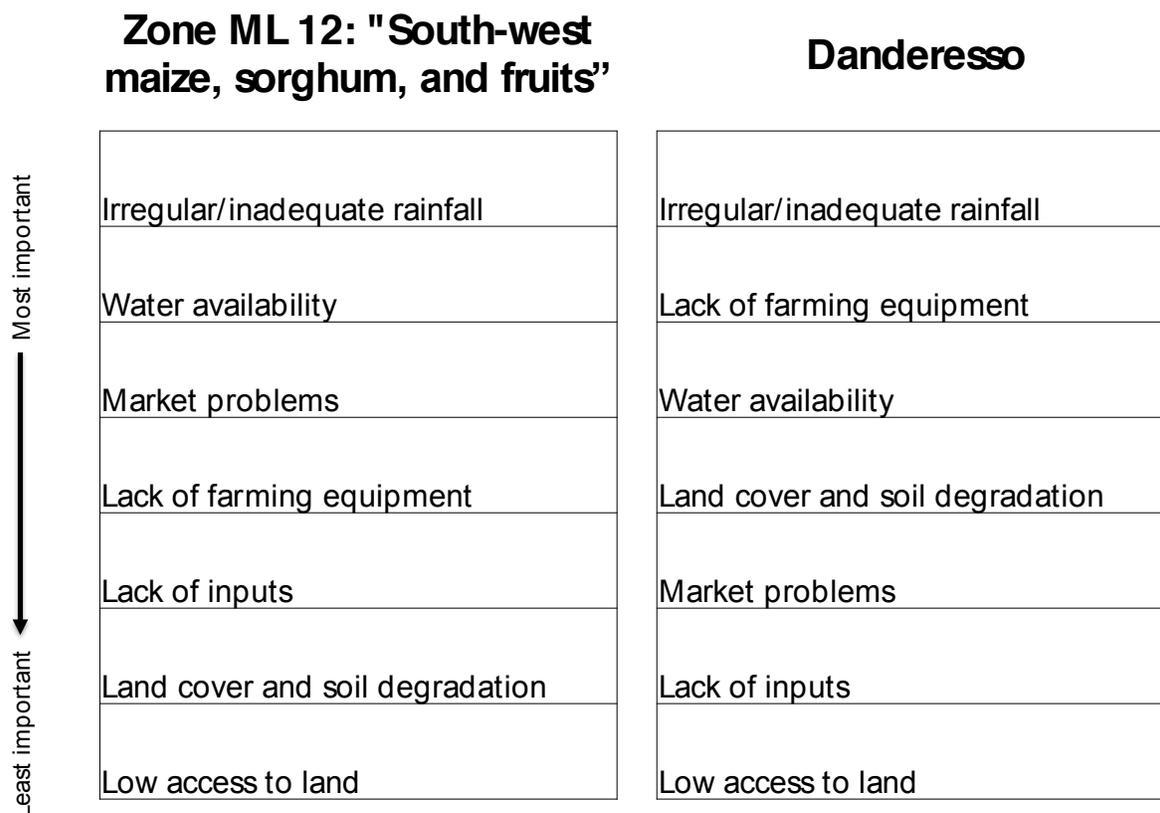


**Figure 5.1.1: Locator map of Danderesso and Zone ML 12. This map represents the assessments interpretation of the boundaries of this zone, and also includes the area where Zone ML 12 unevenly shades into Zone ML 10. Danderesso is found in this transition zone. Map credit: Christopher J. Witt, Department of Geography, University of South Carolina.**

Danderesso receives between 1000-1300cm of rain each year. Nearly all rain falls between May and October, with the heaviest rains between the beginning of July and the end of August. When consulting the residents of this zone, both Dixon and Holt (2010, p.115) and the preliminary report (Carr, 2014a, p.87) found variable rainfall to be a significant challenge. These two sources also agreed on the importance of lack of access to inputs and farming equipment. Finally, Dixon and Holt noted that all households in the zone experienced a hungry season between July and August, as the previous season’s food supply ran out and they waited for the new harvest. Poorer households are more impacted by this challenge, as they lack the assets, such as small animals, they might sell to raise money for food. Figure 5.1.2 represents a qualitative ranking, from most to least important, of the stressors mentioned by respondents in the villages of Zone ML 12, and specifically in Danderesso, in the preliminary assessment of the Agrometeorological Program.

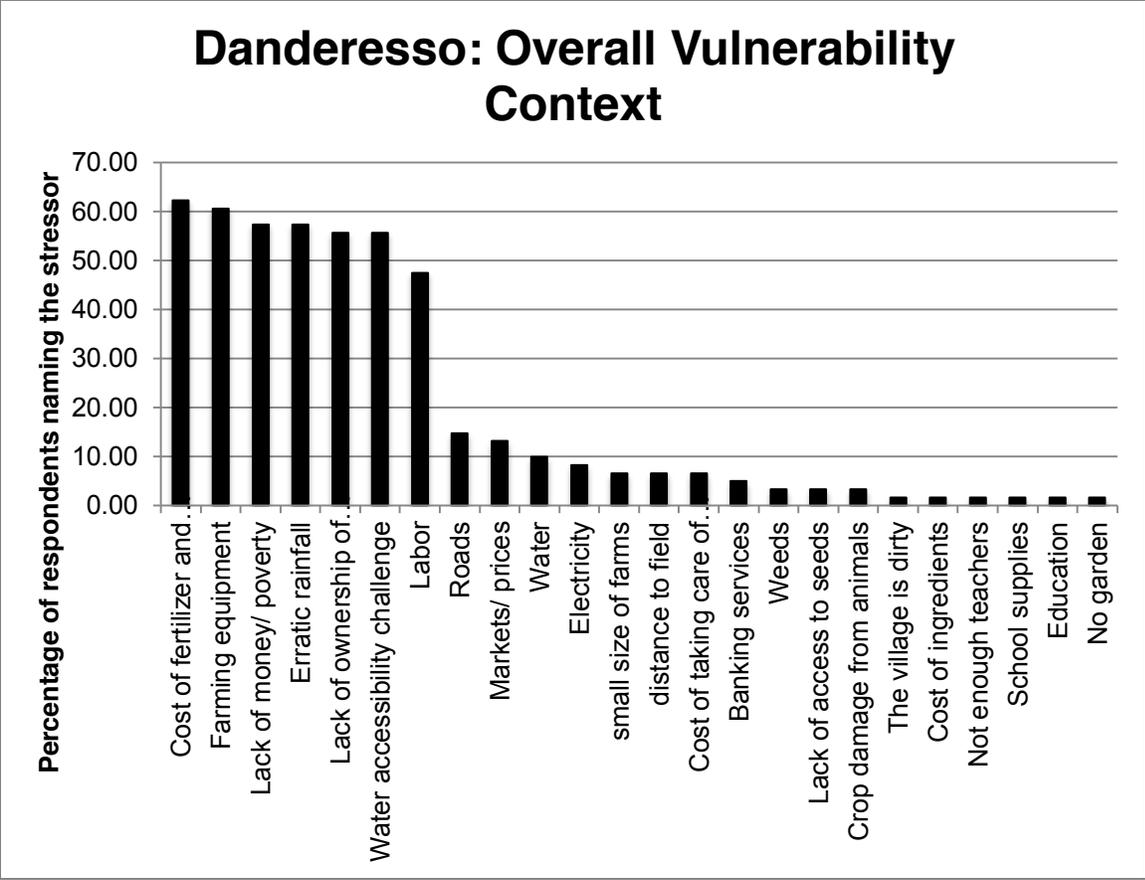
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<sup>4</sup> Note that Danderesso is located well north of where FEWS-NET places this zone (Dixon and Holt, 2010). Independent data analysis conducted by HURDL for the preliminary assessment (Carr, 2014a) found that the livelihoods characteristics associated with this zone by the FEWS-NET effort extended well north of where that study placed this zone.



**Figure 5.1.2: Vulnerability contexts of Zone ML12 and Danderesso specifically, from the 2012 preliminary assessment**

Figure 5.1.3 represents a much deeper analysis of the vulnerability context of Danderesso, gathered through over 60 semi-structured interviews in June and July of 2014. This more detailed data reveals an assemblage of vulnerability broadly similar to that seen in the preliminary data from both Zone ML 10 as a whole and Danderesso specifically. In 2014, access to inputs and equipment were the most commonly-cited challenges in the village, closely followed by poverty/lack of money (linked to the asset and hunger challenge mentioned above), and erratic rainfall. One interesting stressor identified in 2014 that did not arise in either the FEWS-NET or preliminary assessment reports was that of labor availability, which was the fifth most commonly-cited stressor in Danderesso. Senior men in Danderesso complained about a lack of young men to work the fields, a problem created when these young men leave the village for work in Sikasso, Bamako, or even surrounding countries (most commonly Burkina Faso, Cote d'Ivoire, and Senegal). Junior men leave the village because they feel they cannot gain access to adequate fields of their own to earn their own money. Generally, this stressor was manifest as either an absence of labor for those who were successful and wished to cultivate more, or as a lack of labor for those (such as women and the elderly) who were forced to work their fields alone.



**Figure 5.1.3: The vulnerability context of Danderesso, from the 2014 assessment**

The preliminary assessment of advisory use (Carr, 2014a) found that a relatively large percentage of the residents of this zone were aware of the advisories (Figure 5.1.4). More than half of the men in this zone (but fewer women) claimed they were using the advisories. However, using the accurate description of the program’s function as a proxy for use, less than 15% of the junior and senior men in this zone were using the advisory. Only one junior woman in this zone demonstrated this working knowledge of the program. Having constructed a detailed understanding of the different identities that shape the ability to make agricultural decisions impacted by the advisories, and now understanding that the ability to act on these decisions is heavily conditioned by access to animals and equipment, we can explain this pattern of use.

## Zone ML 12: "South-west maize, sorghum and fruits"

	Aware of program	Follow advice	% likely using
GLAM senior men	33.33%	33.33%	13.89%
GLAM senior women	30.00%	0.00%	0.00%
GLAM junior men	44.44%	22.22%	12.35%
GLAM junior women	20.00%	10.00%	0.00%

**Figure 5.1.4: Rates of advisory use in Zone ML12, from the 2012 assessment**

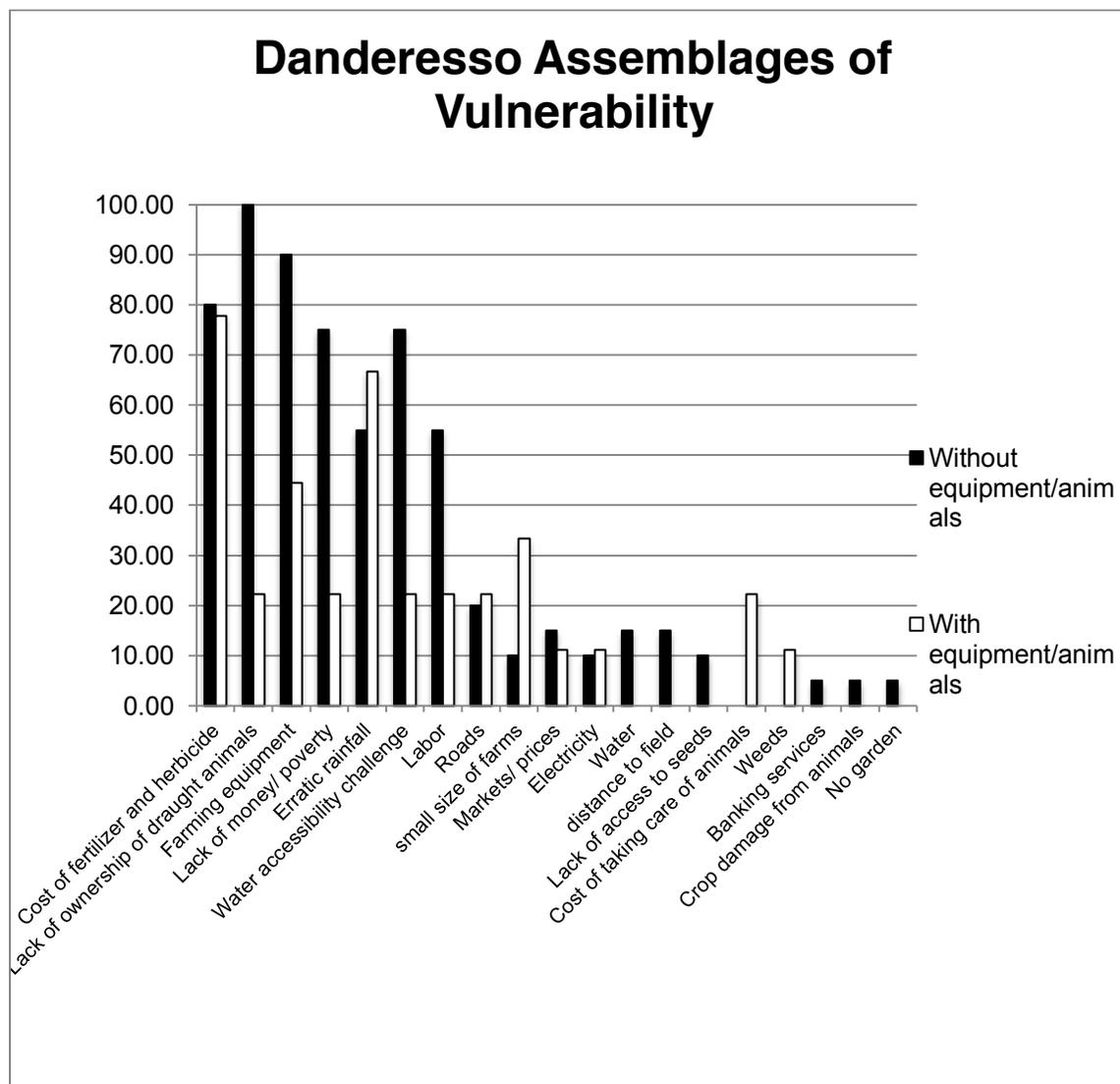
In 2014, only 24% (seven out of 29) of those interviewed in Danderesso about the information they used to inform agricultural decisions made reference to the use of forecasts (a generous proxy for advisory use) (Figure 5.1.5). Even when generously interpreted, these rates are low and highly gendered. The patterns of use in Danderesso align with the patterns of use seen in the larger livelihoods zone to which this village belongs.

### Danderesso Advisory Use

	Individuals	Claim to use	Are using
Senior Men	6	50.0%	33.3%
Senior woman	6	0.0%	0.0%
Junior Men	8	37.5%	25.0%
Junior woman	9	11.1%	0.0%

**Figure 5.1.5: Rates of advisory use in Danderesso, using a generous interpretation of use, from the 2014 fieldwork.**

Much as the use of advisories varies within the livelihoods zone and the village, so too does the experience of the vulnerability context. First, a basic analysis of individuals' reported hierarchies of vulnerability broke out clearly between those with access to animals, equipment, and inputs, and those who lacked adequate access to all three (Figure 5.1.6). When looking at the seven most commonly-cited stressors, it is clear that this dividing line produces completely different experiences of Danderesso, as these groups only share concerns for the price of inputs and the variability of rainfall.



**Figure 5.1.6: The assemblages of vulnerability in Danderesso, from the 2014 fieldwork.**

### 5.1.1. IDENTITY IN DANDERESSO

These two groupings are not themselves homogenous. Within these groups are individuals with different livelihoods roles and responsibilities which shape their activities, decisions, and therefore their current and potential use of advisories. The literature on the social organization of the Senoufo strongly suggests that two key social markers shape the roles and responsibilities of individuals in rural communities: their gender and their seniority (see discussion in Section 4.1 above).

Residents of the community associate many characteristics with being a “good” man, among them a strong work ethic, the ability to provide housing, food, and income for his wife and children, and a willingness to share with others in his family or community. Further, there is general agreement that a good man makes money, principally through farming (though there are other, nonfarm activities that some men undertake, such as teaching and blacksmithing). However, these characteristics are nuanced and layered with other characteristics depending on the seniority of the man. Senior men have the greatest authority in Danderesso, with the greatest authority concentrated in the hands of the most senior man in the extended family group (sometimes called a concession, or *narigba*). One senior man noted that the most senior man in charge of the concession makes all of the decisions regarding most activities in the concession because he is the oldest man in the concession and that is tradition (Interview #3). Another senior man agreed, noting that the authority of the most senior man in the concession includes decisions of resources, farming, animals and finances (Interview #59). No interviewee in Danderesso questioned the decision-making authority of the senior man. Residents justified this structure in terms both of tradition and in terms of the senior man’s hard work, suggesting that a good head of the *narigba* earns the respect that goes along with being in charge of a concession through example as much as tradition. It is possible for a senior man to eventually lose the authority that goes along with being head of the *narigba*, principally when he is no longer able to work or care for himself. At that time, the head of the *narigba*’s oldest son may temporarily take over decision-making until the head passes away, and he inherits the title. The descriptions of decision-making and authority from interviewees in Danderesso conform to those in the ethnographic literature on the Bambara and Senoufou.

A good junior man should oversee his household (*gbagui*) within the concession, but must do so in the context of meeting the wider needs of the concession as determined by the head of the *narigba*. While all men are expected to listen to their elders (even senior men must listen to the head of the *narigba*), this is a particularly important characteristic for a “good” junior men. One junior man argued that a junior man’s only responsibilities are to listen to senior men and work, because all other responsibilities will follow from those actions (Interview #5), while a senior man noted junior men are not to question or contradict decisions of senior men (Interview #1). Thus, junior men do not make many agricultural decisions. They will have greater control over the decisions related to their *gbagui* farms. Further, when senior members of the concession are no longer able to work, it is the responsibility of junior men and women to care for them. Therefore, when junior women suggest that their husbands (generally junior men) make all the decisions for the *gbagui*, this is true only in a relative sense. From the perspective of junior women, junior men do make most *gbagui* decisions, but most of these decisions are in turn made by, or strongly shaped by, head of the *narigba*. At the same time, this means that junior men bear a much-reduced responsibility for raising enough food to feed their concession relative to senior men. Instead, they negotiate other pressures. Junior men are expected to find and keep a good wife and a good family. Earning money from agriculture and other activities allows junior men to convince women (and often their fathers) that they are suitable husbands, and therefore “good” junior men. While their labor and individual skill might shape the amount of food they raise, they rarely make any of the decisions with regard to what to plant, when to plant it, or on what land to plant. Because these men have to earn money to get married, and have trouble earning their own money while working in a senior man’s concession, their reduced responsibility for the provision of food and grain to the concession relative to senior men likely enables their decisions to leave the village and take up work elsewhere.

According to those interviewed in Danderesso, a good woman provides for the domestic needs of the household to which she belongs. For example, one junior man noted that women do not cultivate crops beyond rice because they do not have time, for while the men are in the fields working the women have to take care of everything else, including bringing them food in the fields (Interview #37). Another junior man noted that women do not have time to grow other things because of the amount of work

they have to do (Interview #62). Thus, a woman who placed her own agricultural production ahead of her domestic duties would not fulfill the responsibilities associated with being a woman.

This said, women are expected to participate in agricultural production. First, they help on the household and concession farms controlled by men, such as the junior woman who noted that she helped her husband with cotton and then corn before farming rice in her fields (Interview #34). Another junior woman noted that women helped to harvest corn (Interview #6). Of prospective wives a junior man noted that if they cannot farm then they are not good women and he would not want to marry them (Interview #34). It is only when they have fulfilled their obligations to the farms of the concession and the household that women take up their own production. Women in Danderesso are expected to work their own rice fields, including obtaining the necessary labor, seed, and inputs necessary. Many women described such acquisition in detail, such as the senior woman who reported paying 10,000 FCFA to plow her field if the rains have not come and the ground is hard, and 5,000 FCFA to plow if the rains have come and the ground is soft (Interview #38). Many women complained of having to prepare their rice fields by hand, suggesting they are aware of the advantages of plowing, while others expressed a detailed understanding of the conditions under which they might plow with animals or by hand. For example, one junior woman noted that sometimes she had to plow by hand, but usually could afford to pay someone 17,500 FCFA to plow her fields for her (Interview #34). The access to animals and equipment is not completely tied to husbands or other men in their concession, as several women (junior and senior) noted that they could not access animals or equipment even though their husbands owned one or both. Further, several women claimed that men did not tell them what to do with regard to rice production, such as the junior woman (Interview #4) who claimed that no one told her when or how to cultivate rice, which she learned as she grew up. She said she knew when to start because of the rains, and claimed that when the wind picks up that means that it is time to start farming. It appears that women develop their own circuits of information and decision-making with regard to rice production. One senior woman claimed that she knew when to start this activity because many other women in the village farm rice, and they all talk and work together (Interview #7). Between men's lack of support for the activity and women's autonomous circuits of knowledge that inform rice production, it is clear that in Danderesso rice farming is a women's activity for which men have no responsibility.<sup>5</sup>

Beyond rice farming, a good woman is one who obeys the instructions of her husbands (and other men in the concession) with regard to the management of the household and the farming of concession and household land. Critically, within agricultural decision-making, the vast majority of married women claim that they are told what to plant and when by their husbands. Within these constraints, good women cook for their husbands and children, gather water, watch the children, and generally take care of the house and household. This rather extensive list of responsibilities, however, is not evenly distributed among women. Junior women are expected to respect and listen to those more senior than them. Thus, within the domestic sphere a senior wife will have the more authority over decisions and activities than her junior counterparts. This is true at the level of the concession and the household. Junior women also have more responsibility for caring for children and will often cook more than senior women. Thus, in Danderesso a junior woman is the most constrained individual with regard to decision-making and authority, answering to men *and* to senior women.

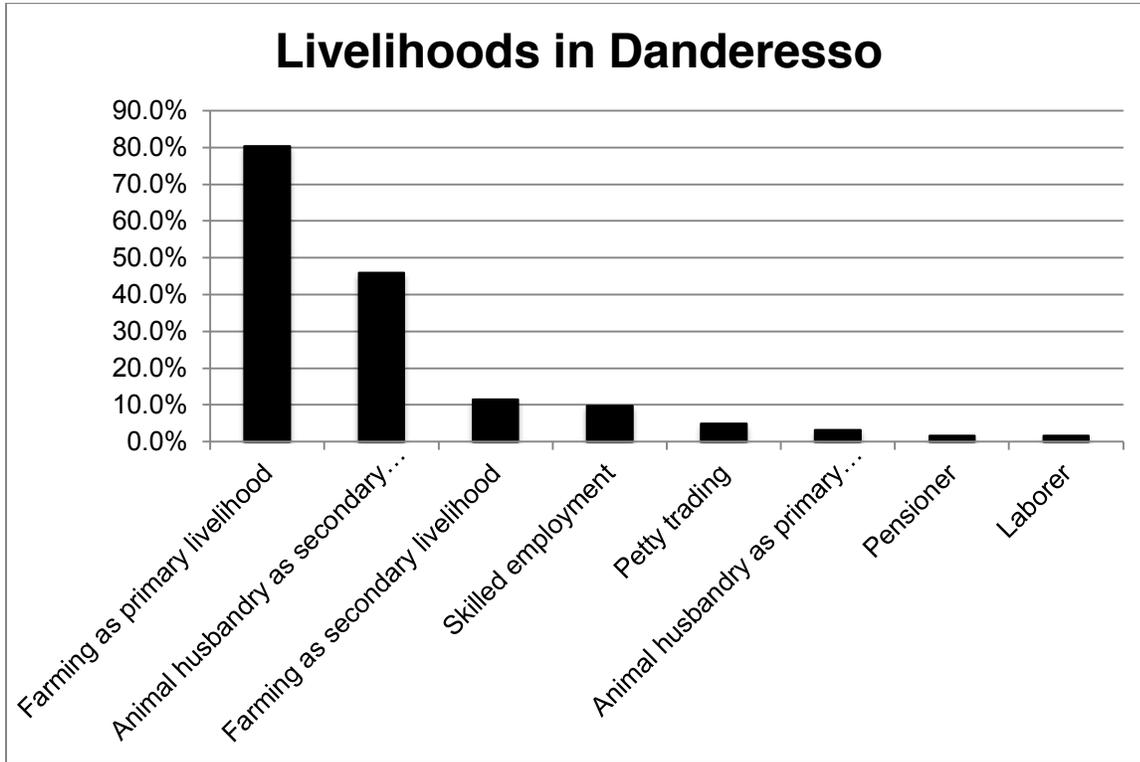
### **5.1.2. LIVELIHOODS IN DANDERESSO**

On the whole, those in Danderesso conduct a limited number of livelihoods activities (Figure 5.1.7). Agricultural activities are at the center of nearly all livelihoods in the community, with other activities taking a secondary role. Only four people in our sample eschewed agriculture completely. These

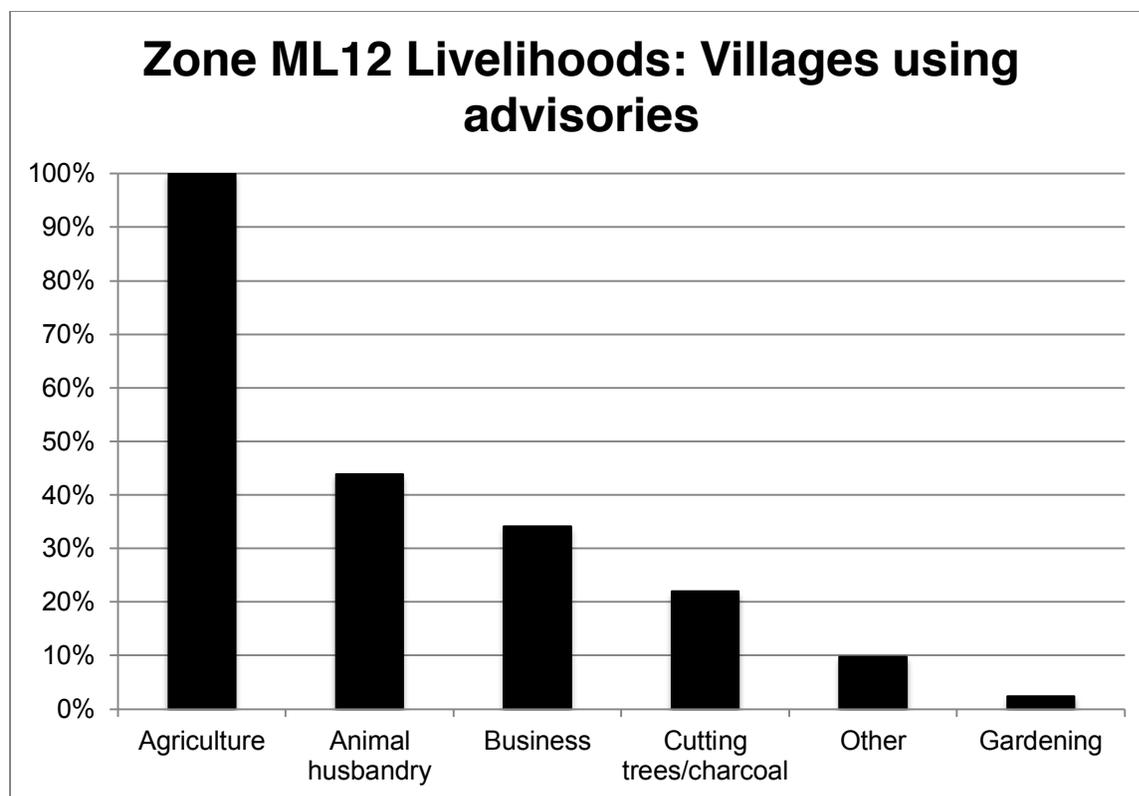
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<sup>5</sup> One man in Danderesso, the village chief, claimed to farm rice. However, this man was elderly and did not conduct much manual labor himself, and so may have been claiming the production of women in his concession as his own.

individuals were not further interviewed, as they had no use for advisories. This pattern is broadly representative of the larger pattern in zone ML12 overall, though the preliminary assessment aggregated livelihoods into somewhat coarser categories (Figure 5.1.8). While agriculture is dominant among most of the population of Danderesso, there were some differences in the activities undertaken by the two major groups we identified in the study of the vulnerability context.



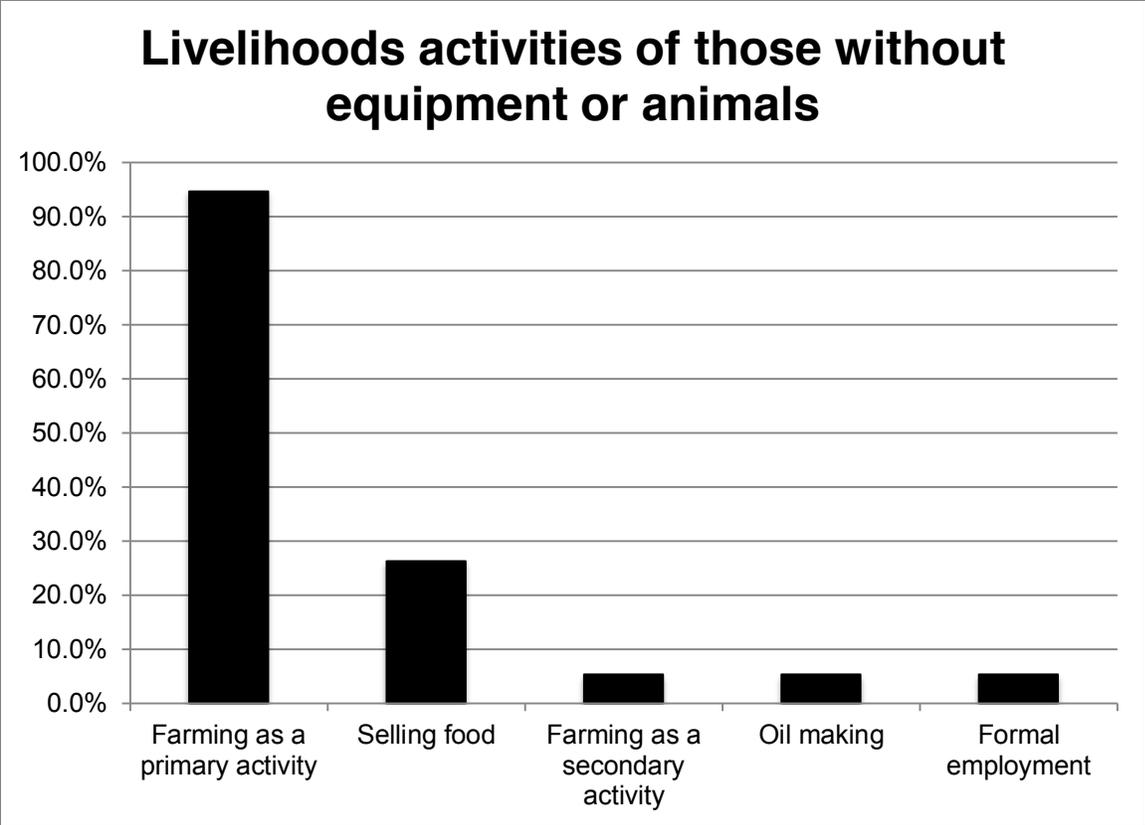
**Figure 5.1.7: The reported livelihoods activities of residents of Danderesso, from the 2014 fieldwork**



**Figure 5.1.8: The reported livelihoods activities of those living in zone ML12, from the 2012 preliminary report**

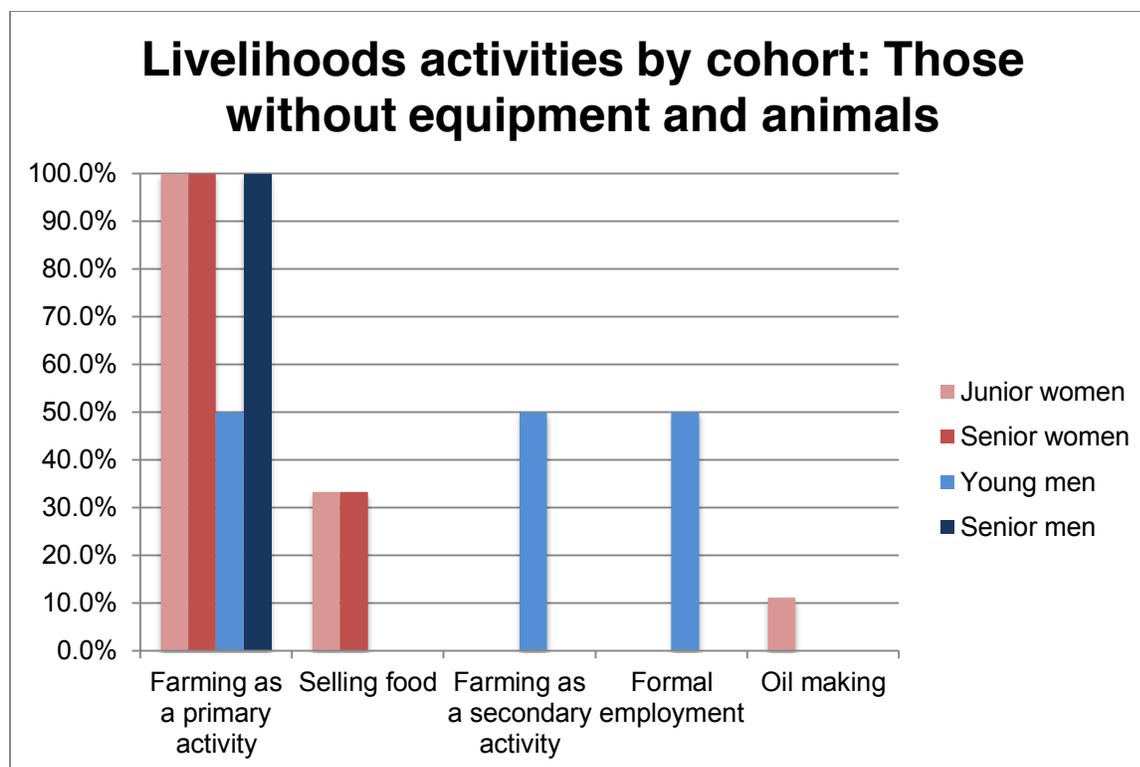
- 5.1.2.1 Those without animals or equipment

Overall, the livelihoods of those in this group are heavily focused on agriculture (Figure 5.1.9). Every member of the group reported agricultural activities as part of their livelihoods. A limited number of individuals attempted to diversify their livelihoods by selling food and making oil from shea nuts. Only 16.7% of this group reported any form of non-farm employment in their livelihoods.



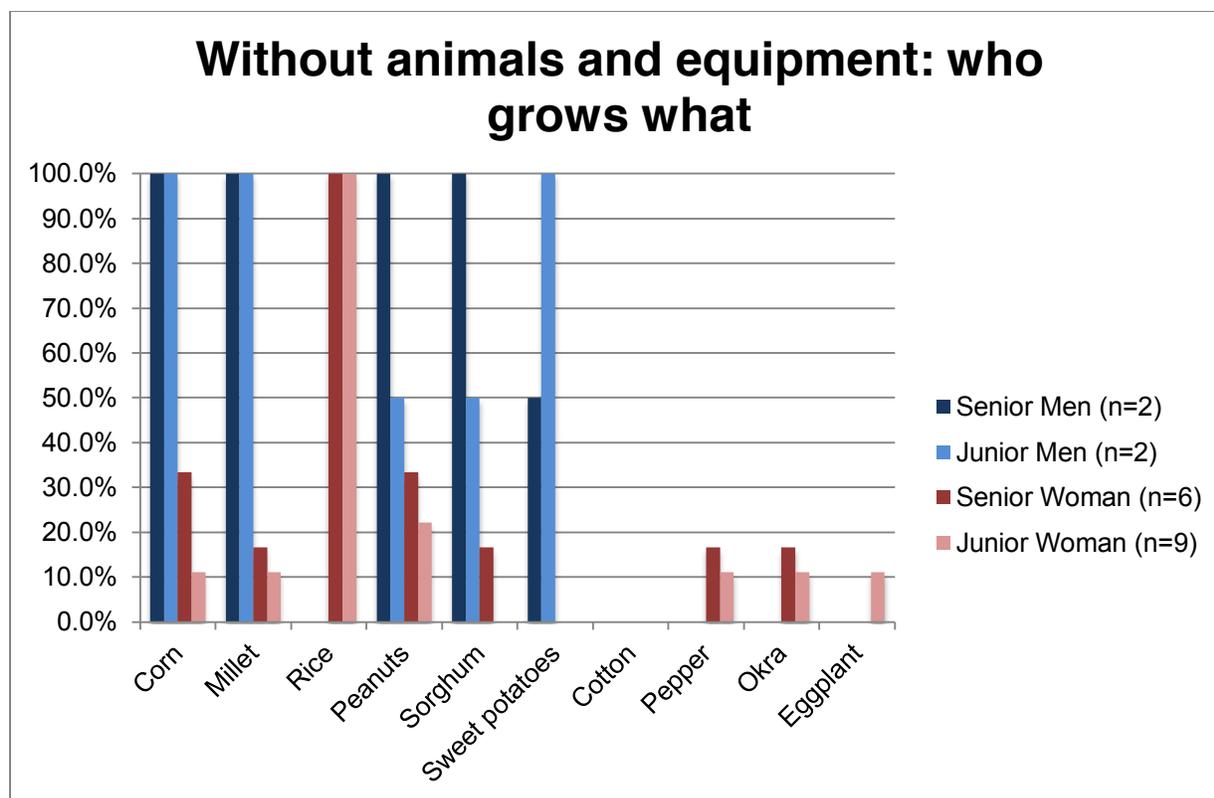
**Figure 5.1.9: Reported livelihoods activities of those without draught animals and equipment**

The men in this group focus on agricultural activities for their livelihoods, with one man mixing these activities with formal employment. A third of the women in this sample make and sell food, and one woman makes shea oil for sale (Figure 5.1.10).



**Figure 5.1.10: Reported livelihoods activities of those without draught animals and equipment by gender/seniority cohorts.**

These patterns gain meaning when we look at the patterns of crop selection (Figure 5.1.11). Women are the sole cultivators of rice in this group, and all women in the group participate in this activity. Men are not prohibited from raising rice, but as one junior woman argued, other crops take up all of men’s time and do not allow them to cultivate rice (Interview #12). Only one junior woman described rice cultivation as women’s work, but even she noted that this gendering was in many ways related to men’s other agricultural responsibilities, which gave them little time for rice cultivation (Interview #44). Very few women raise any other grains, and senior women always participate in non-rice grain cultivation at higher rates than junior women. According to one junior woman, this focus on rice to the exclusion of other grains is not a rigid rule, as women would be allowed to farm sorghum or corn if they had time (Interview #34). However, this same woman said that women would but never be allowed to farm cotton because that is a man’s crop. Women also dominate the cultivation of vegetables, but this is a relatively marginal activity. Men dominate the cultivation of all other grains and cotton. The grains serve as a means to feed their families, while cotton serves as a source of capital and inputs for agricultural production. It appears that peanuts and sorghum are of greater interest to senior men than junior men, and sweet potatoes are of greater interest to junior men than senior men.



**Figure 5.1.11: Reported crop selections among those without draught animals and equipment by gender/seniority cohorts.**

Figure 5.1.12 represents the stated use of crops by different members of the group. This data was gathered on an ordinal scale, where 1 represented a subsistence crop, and 5 represented a crop exclusively for market sale. The scores of crops were averaged for each group to generate the uses above. While the use data sample sizes from Danderesso are very small, we can draw a few broad lessons from this exercise. The overall agricultural production in this group, across all seniority/gender cohorts, is strongly oriented toward subsistence. Senior men and women are nearly exclusively focused on the cultivation of subsistence crops. For senior men, especially those heading concessions, who are responsible for making decisions that result in enough food to feed the household and/or concession for the entire year, their focus on subsistence makes sense. This role, and meeting this responsibility via agricultural production, is critical to senior men's identity. One senior man in this group (Interview 59) claimed that the reason he farmed is because if he did not, he would not be respected in the village. Both senior men in this group noted that they had become too old to farm cotton, and while in positions of authority within their concessions, both appeared to have reduced their direct role in cultivation, emphasizing their role as decision-maker at the expense of the role of hard worker. Senior women, on the other hand, seem to produce for subsistence because they lack the access to labor, inputs, and equipment needed to generate a marketable surplus. Senior women who successfully farmed rice (Interviews 38 and 25) described agriculture as a means of both providing food for the family and earning money. However, the senior women in this group make it clear that earning money through farming is contingent on raising a marketable surplus. For example, one senior woman (Interview 35) farmed rice, pepper, peanuts and okra. However, she claimed to eat all of the peanuts, most of the pepper and rice, and use the okra as a source of cash income. Another woman (Interview 38) notes that she and her family eat most of the rice, which allows her to sell only a little. In short, senior women are playing the role of good woman and good wife by meeting the needs of the household with their

production, and only after that occurs turning to the generation of income. In general, these women rarely generate such income because they lack access to inputs and equipment that might boost yields, further emphasizing their role as subsistence producers.

### Crop Use: Without Equipment and Animals

Crop	Avg	Interpreted value	n=
<b>Peanuts</b>			
Senior Man	n/a		
Junior Man	1.00	Eat all	1
Senior Woman	1.00	Eat all	1
Junior Woman	2.50	Eat and sell equally	2
<b>Millet</b>			
Senior Man	1.00	Eat all	1
Junior Man	1.00	Eat all	2
Senior Woman	1.00	Eat all	1
Junior Woman	n/a		
<b>Sweet potato</b>			
Senior Man	n/a		
Junior Man	5.00	Sell all	2
Senior Woman	n/a		
Junior Woman	n/a		
<b>Pepper</b>			
Senior Man	n/a		
Junior Man	2.00	Eat more than sell	1
Senior Woman	n/a		
Junior Woman	3.00	Eat and sell equally	1
<b>Eggplant</b>			
Senior Man	n/a		
Junior Man	n/a		
Senior Woman	n/a		
Junior Woman	4.00	Sell more than eat	1
<b>Sorghum</b>			
Senior Man	1.00	Eat all	1
Junior Man	1.00	Eat all	1
Senior Woman	1.00	Eat all	1
Junior Woman	n/a		
<b>Maize</b>			
Senior Man	1.00	Eat all	1
Junior Man	1.00	Eat all	2
Senior Woman	1.00	Eat all	1
Junior Woman	2.00	Eat more than sell	1
<b>Rice</b>			
Senior Man	n/a		
Junior Man	n/a		
Senior Woman	2.20	Eat more than sell	5
Junior Woman	2.67	Eat and sell equally	9
<b>Okra</b>			
Senior Man	n/a		
Junior Man	n/a		
Senior Woman	n/a		
Junior Woman	4.00	Sell more than eat	1

**Figure 5.1.12: The reported uses of crops among those without draught animals and equipment by gender/seniority cohort.**

Where senior men and women are focused on subsistence production, junior men and women are cultivating both subsistence and market crops. This orientation of junior men's production comes from their reduced responsibility to the concession relative to senior men, which makes it easier to cultivate a marketable surplus. Unlike senior men, junior men have to seek out personal income to build up the resources necessary to get married and gain access to their own fields, creating this divergence in crop selection. As one junior man in this group noted, while his agricultural work must support that of his father, he can also sell some of his crop and eat the rest (Interview 43). The other junior man (Interview 20) interviewed in this group farmed his fathers' land, as his father was too old to work. This second man, therefore, did not lack for access to land that might create a marketable surplus. Further, both men cultivated sweet potatoes, a crop they viewed as principally for sale. While this crop is not a priority relative to staple grains like maize, peanuts, and millet, it still provides some income. Junior women, like senior women, have a great deal of autonomy with regard to rice production, which is the central crop in their agricultural production. However, junior women sell some, or even a majority, of every other crop they cultivate. One junior woman (Interview 17) was able to produce marketable surpluses of all her crops because her concession was only her household. As a result, she only had to work for and answer to her husband, without having to worry about contributing labor to both household and concession

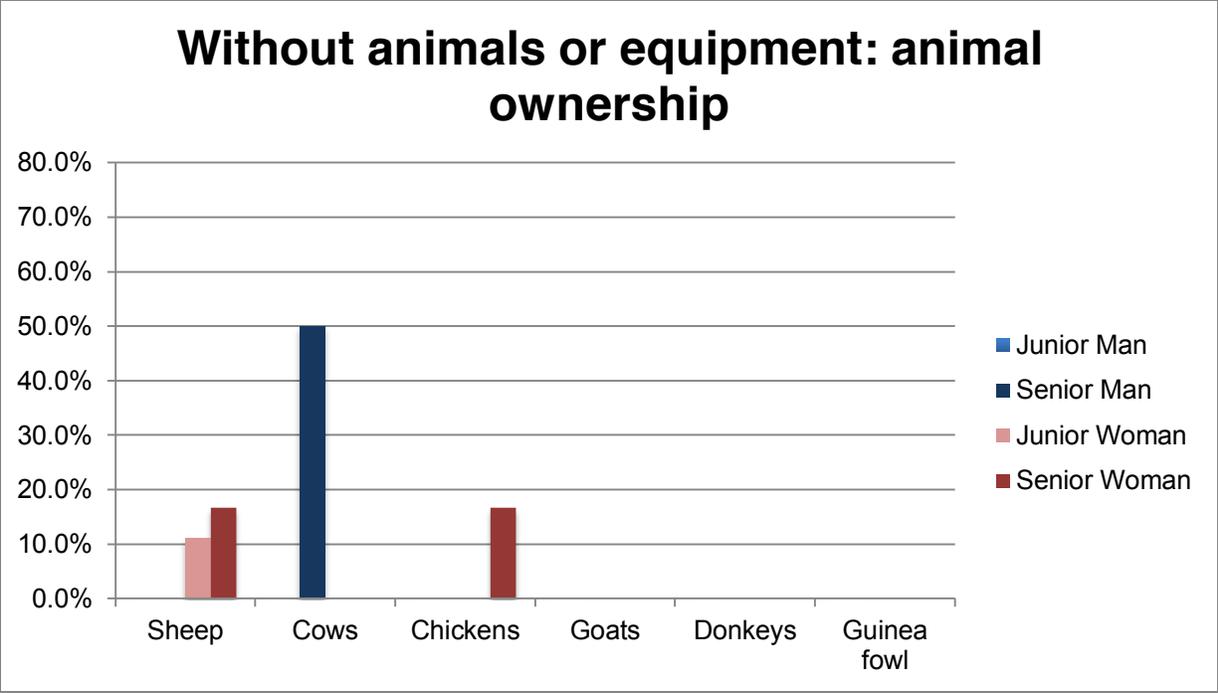
fields. The situation of another junior woman (Interview 13) more readily captures the agricultural responsibilities of women that allow for marketable surpluses, but also serve as constraints on women's production. If she is able to earn significant money from her rice production, then she has to give some to her mother and her husband, but if she earns less she gives much less. This is a powerful negative incentive with regard to junior women's production, as the income from excessive surplus production will likely be absorbed by the concession or household. Thus, these women have the latitude to produce a surplus from their rice and other production, but no incentive to generate that surplus. This, in turn, limits their decision-making authority in the household. As the junior woman in interview 13 notes, at the concession level she does not make any decisions about money because she doesn't make enough to contribute (a claim repeated by the junior woman in Interview 12, and repeated for the household level by the junior woman in Interview 34). This implies that women who earn a large amount of money eventually develop at least a limited voice at the level of concession decision-making. This voice, however, is closely tied to seniority. Two other junior women (Interviews 4 and 6) note that they are simply too young to participate in any sort of decision-making, again suggesting that as they age, their seniority might lend them voice in household and concession-level decisions.

Senior men without access to animals or equipment generally focused on short-cycle varieties for all of their staple crops. The two men interviewed in depth only knew the formal name of one of the varieties they were cultivating. One of the men said he was cultivating Dembanyuma, a 105-110 day cycle. For all other crops, both men did not give formal names for the variety, calling all varieties of all staple grains *tileman*, or "fast", except for one peanut variety, which one of the men used in good years, which he called *sumani*, or "slow." Formally, *tileman* peanuts are 47-10, a 90 day cycle variety. *Tileman* maize is Niéleni, a 75-90 day cycle. *Tileman* millet is a local variety called Souna, an 80-90 day cycle variety. *Tileman* sorghum is formally CSM 388, a 100-110 day cycle. In short, nearly all varieties of all crops of senior men without access to animals and equipment tend toward short cycles. This pattern makes sense given the constraints under which these men operate. First, they must contend with a condensed season, as they cannot farm until they are able to borrow or rent animals and equipment. Second, in that condensed season, they plant in sequence. As maize is seen as the central source of food in Danderesso, it is usually planted first. Therefore, it makes sense that these men would be more aware of the names and formal characteristics of maize varieties than any others, as this is the one crop where they are most likely to have a decision to make about variety length. Nearly all others will be planted after maize, and so far into the season that these men must use short-cycle varieties to ensure a meaningful harvest. Millet and peanuts, which tend to be planted last by these men, are the shortest cycled crop varieties, reflecting the limited growing season remaining by the time they are planted.

Junior men without equipment and animals were also strongly focused on short-cycle varieties. As with senior men, formal knowledge of varieties of staple grains, such as the name of the variety, was limited to maize. One man reported planting Dembanyuma, a 105-110 day cycle, while the other was planting Tiemantié de Zamblara, a 90-day cycle variety. One man knew the sorghum variety he grew (*fanga dro*, a longer 120-130 cycle variety). One man reported planting *tileman* peanuts (47-10, a 90 day cycle variety). Overall, these men focused on fast-growing, drought-tolerant varieties. As with senior men without animals and equipment, this pattern of variety knowledge and selection reflects the greatly compressed agricultural season with which these men contend. Within this compressed season, the fact maize tends to be planted first means that this is often the only crop for which there is enough season left to allow for cycle length selections. These men did know the varieties of the sweet potatoes they raised (*dragon*), which they selected because it produced large potatoes. This knowledge reflects their capacity to make decisions about and gain personally from this crop, relative to their authority and capacity to act on the cultivation of staple grains.

One senior woman in this group planted maize, millet, sorghum, and peanuts, but only because she was taking over from her old, ill husband. This woman planted *tileman* varieties of all her crops. One junior woman also planted peanuts, maize, and millet. She also planted *tileman* varieties of peanuts and maize. However, she planted Sanyo, a local variety of millet with a 120-day cycle. These choices closely mirror the variety selections of senior men without access to animals and equipment, likely reflecting the influence of these men over agricultural decisions of women. Interestingly, four of these women (two senior, two junior) named more than one variety of rice, either saying they would use *tileman* (fast) or *sumani* (slow) varieties depending on seasonal precipitation, or *gniri ka* (which only needs a little water) or *ka bin ka* (which uses a lot of water) or *fama* (also uses a lot of water). The fact these women named different varieties with different cycle or drought resistance characteristics suggests that they are able to make decisions about what to plant, even though their rice planting is greatly delayed by lack of access to animals and equipment, and by their responsibilities to the household and household farms.

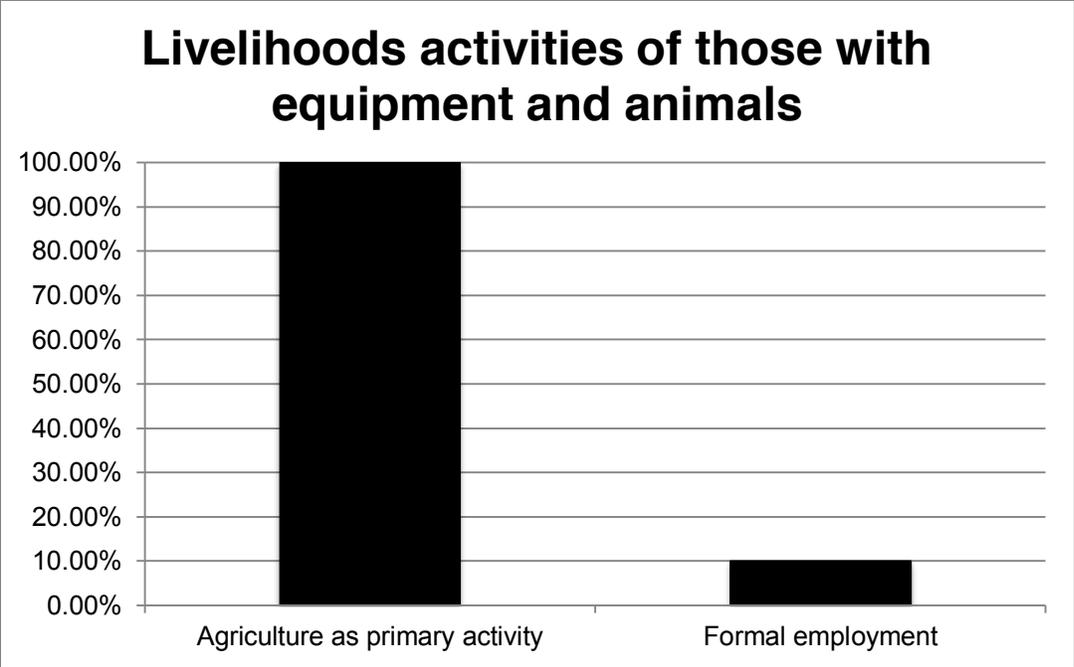
There is little animal husbandry in this group, and nearly all of it falls to senior women (Figure 5.1.13). However, the members of this group share broad perceptions of the utility of particular animals. Of the five members of this group who gave a reason for owning chickens, all noted that these were most useful when sold, and the money was used to meet a personal or household need. Similarly, the three people who mentioned goats, and the 16 members of this group who discussed sheep, all saw these animals as also for sale to raise money for needs. Fourteen members of the group discussed cows, and of these 13 mentioned their utility as a source of traction. One junior man saw them solely for sale, one junior woman saw cows as a potential source of income more than a source of traction, and three more (one junior woman, one senior woman, and one senior man) old saw the sale of cows as a secondary benefit after traction. Both members of the group who mentioned donkeys saw them as a source of transportation. There do not appear to be any gendered or other restrictions on the ownership of animals. Fifteen of the 17 group members who discussed why they did not own animals, or the restrictions that prevented others from owning animals, argued that the issue was money. One junior woman (Interview #44) claimed that when people do not own animals it is because they cannot afford to purchase or care for them. This woman said that with the appropriate financial resources, it would be no problem if she or any other person in the village wanted to raise animals. Similarly, another junior woman noted that anyone is welcome to raise any animal of their choosing, but money was a major constraint (Interview #13). Two women, one junior and one senior, argued that men did not let women own animals. The senior woman argued that men do not let women raise animals, because “in Danderesso men and women are not equal” (Interview #24). This woman argued that money was a critical constraint on animal ownership, but only for men.



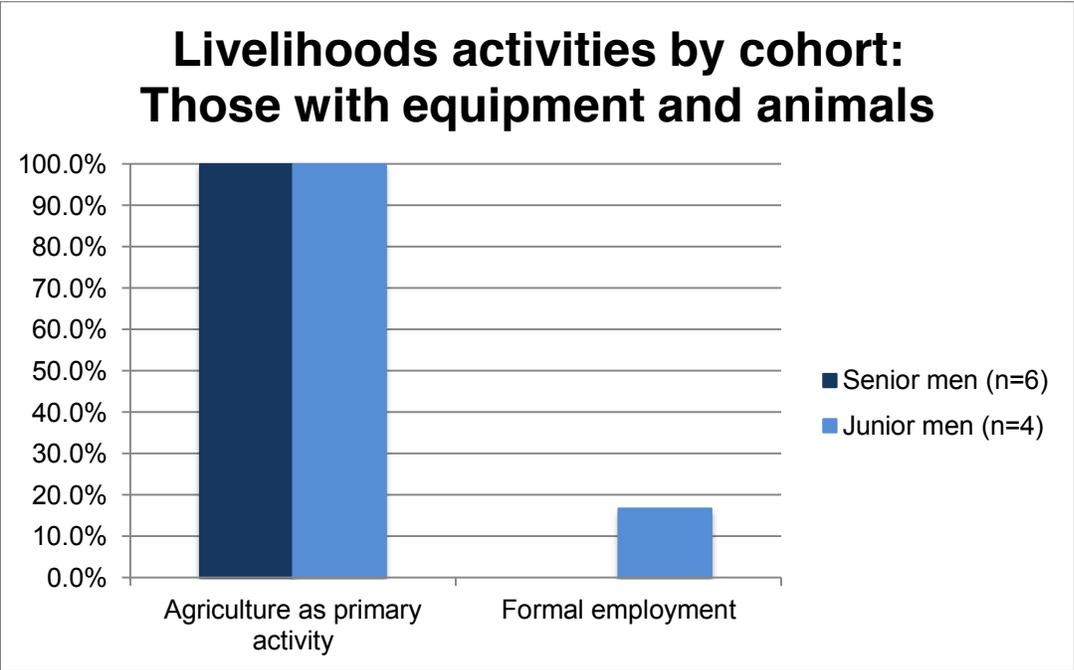
**Figure 5.1.13: Animal ownership among those without draught animals or equipment by gender/seniority cohort.**

- 5.1.2.2 With animals and equipment

Every member of this group is a man, and all see agriculture as their central livelihoods activity (Figure 5.1.14). One individual, a junior man, also works as a teacher. There is little difference of importance between the livelihoods of those in this group across seniority (Figure 5.1.15). All of these men cultivate cotton, a cash crop that can bring a great deal of income to them and their families. The income from cotton provides these men a degree of security not seen among individuals without animals and equipment. For example, one senior man (Interview 19) said he liked farming because he can work hard during the rainy season and earn enough money that, after harvest, he can rest for a few months (senior men in Interviews 5 and 3 echoed this sentiment). Another junior man (Interview 15) highlighted the importance of cotton in livelihoods, noting that those who do not farm cotton have more issues with obtaining resources than those who do farm cotton. Further, this man noted, those who farm cotton will earn more money, have animals, and be able to work faster and farm more crops. On the other hand, the heavy market orientation of this group opens them to different stressors. As this junior man pointed out, if he doesn't sell his crop then he cannot earn money and then he will not be able to farm the next year (Interview 15). Further, for those who produce cotton, CMDT is itself a stressor. In the course of fieldwork, farmers wanted the research team to measure their fields and report the true size. Many men feel that representatives of CMDT come to the village and tell them their fields are much bigger than they really are, so they can loan seeds and fertilizer for an expected harvest that is, in fact, impossible to achieve. Men reported feeling trapped by CMDT, and clearly did not trust the organization. In this regard, the livelihoods and vulnerabilities of men in this group are different from those of men who lack access to animals and equipment.

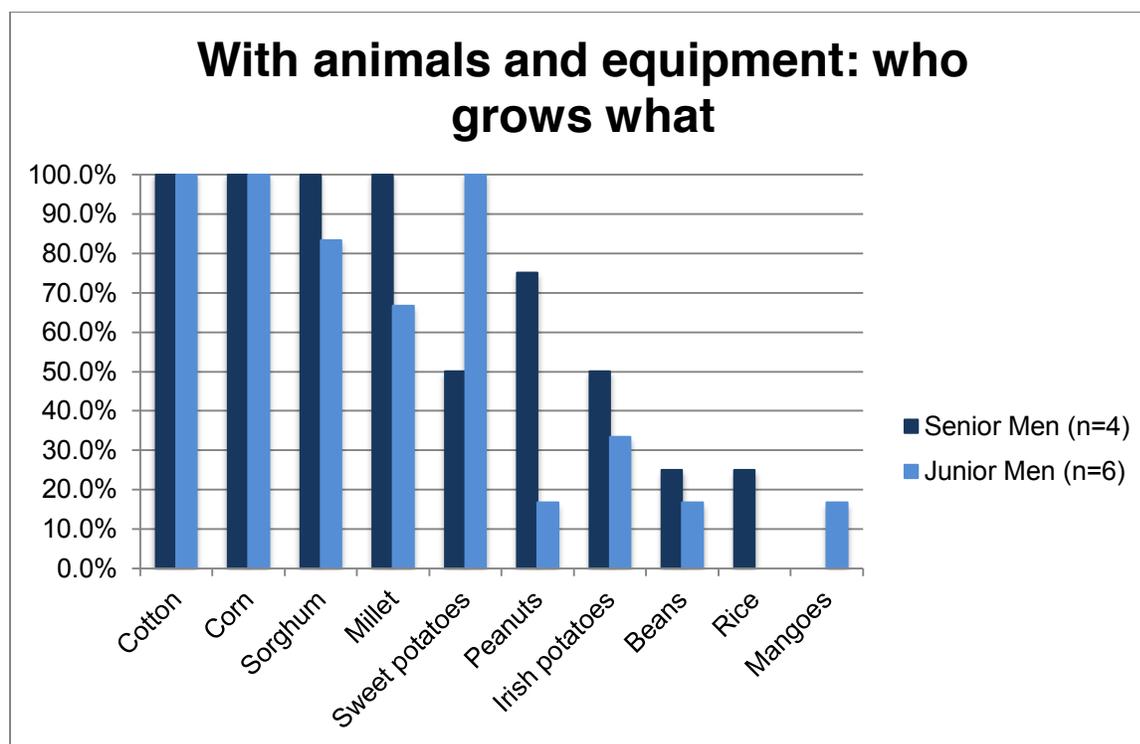


**Figure 5.1.14: Reported livelihoods activities of those with draught animals and equipment.**



**Figure 5.1.15: Reported livelihoods activities of those with draught animals and equipment by gender/seniority cohorts.**

While cotton cultivation, and its attendant income, make the livelihoods of these men different from those who lack access to animals and equipment, they are still subject to the roles and responsibilities associated with their gender and seniority. This is visible in the different ways in which junior and senior men in this group conduct their agricultural work (Figure 5.1.16). While all men in this group grow cotton and maize, senior men are cultivating peanuts a much higher rates than junior men. They are also cultivating sorghum and millet at somewhat higher rates. They grow peanuts in small quantities, and only for consumption. These men plant peanuts late or last among their crops, suggesting their relatively low importance to livelihoods. Junior men are much more interested in sweet potatoes. This crop is at least partially for sale, and generally is planted in the middle to end of all crops. Therefore, it is less important than cotton and corn, which are always the first two crops planted by these men, but about as important as the sorghum and millet favored by senior men.



**Figure 5.1.16: Reported crop selections among those with draught animals and equipment by gender/seniority cohorts.**

This divergence reflects a somewhat different attitude toward the goal of agricultural production between junior and senior men (Figure 5.1.17). While junior and senior men largely agree on the use of individual crops, the differences in what they choose to cultivate are important. The peanuts emphasized by senior men are a subsistence crop, while the sweet potatoes cultivated by a large percentage of junior men are a crop for market sale. Further, while senior men plant staple grains like sorghum and millet right after cotton and maize, junior men often plant sweet potatoes and other market crops before planting sorghum and millet, if they plant them at all. Thus, junior men are a bit more focused on market production than senior men. The roles and responsibilities of junior and senior men have not changed because these men have access to animals and equipment. Instead, they are manifest in somewhat different ways. Senior men still have a concern for meeting the food needs of their concessions and households, but rely heavily on cotton cultivation to provide the financial resources that enable this production. Junior men, much like their counterparts without equipment and animals, are less tied to meeting the subsistence needs of their concessions, and therefore orient themselves more toward market

production which enables the acquisition of material assets needed to increase their agricultural capacity and social status. They can use these assets to also secure the right to marry, and to gain access to their own fields – in short, to become senior men in their own right.

### Crop Use: With Equipment and Animals

Crop	Avg	Interpreted value	n=
<b>Peanuts</b>			
Senior Man	1.00	Eat all	2
Junior Man	n/a		
<b>Mango</b>			
Senior Man	n/a		0
Junior Man	4.00	Sell more than eat	1
<b>Potato</b>			
Senior Man	4.50	Sell all	2
Junior Man	n/a		0
<b>Sweet Potato</b>			
Senior Man	5.00	Sell all	1
Junior Man	4.00	Sell more than eat	4
<b>Cotton</b>			
Senior Man	5.00	Sell all	3
Junior Man	5.00	Sell all	4
<b>Sorghum</b>			
Senior Man	1.75	Eat more than sell	4
Junior Man	1.67	Eat more than sell	3
<b>Millet</b>			
Senior Man	2.67	Eat and sell equally	3
Junior Man	2.00	Eat more than sell	1
<b>Maize</b>			
Senior Man	1.00	Eat all	3
Junior Man	1.33	Eat all	3
<b>Rice</b>			
Senior Man	3.00	Eat and sell equally	1
Junior Man	n/a		0

**Figure 5.1.17: The reported uses of crops among those with draught animals and equipment by gender/seniority cohort.**

Senior men with access to animals and equipment knew the formal names of all the varieties of staple crop and non-staple vegetables they grew. Many times these men listed more than one variety, generally splitting the varieties into fast and slow-maturing categories. This reflects the many decisions they make each season, as they can prepare fields and start cultivation at will. One senior man, while not a user of the advisories, captured the decision-making capacity of this group in noting that he prefers to plant a sorghum variety called *Bimbiriba* (120-130 days), which is a long cycle crop that brings good yields, but will plant *Tileman* if the rains start late and therefore compress the season. These men do not appear to have any real choice in the variety of cotton they cultivate, as it appears to be provided to the farmers by CMDT. Among senior men, there were variety selection differences that appear to be associated with their use (or lack of use) of the advisories. Overall, those using the advisories were planting much shorter-cycle varieties for all major grains than those who were not. For example, senior men using the advisories planted short-cycle varieties (Tuxpeno, a 90-day cycle, or Niéleni, a 75-90 day cycle). The men who were not using the advisories were planting Dembanyman, a 110 day cycle variety.

Junior men with animals and equipment knew far fewer of the formal names of their varieties than did senior men with animals and equipment. They had no choice in their cotton varieties, again because it appears that CMDT selects for them. Most of these men were planting *Dembanyuma*, a 105-110 day cycle maize variety that several claimed had high yields. One of these men (Interview 37) made it clear that this uniformity was likely a product of the season, as he claimed to plant either *sumani* or *tileman* varieties depending on the timing of the rains. Thus, these men do make choices with regard to varieties. However, it is worth noting that two of the senior men with animals and equipment also planted *Dembanyuma*, and therefore it is possible that even this variety selection could be largely governed by the choices of senior men.

### 5.1.3. DANDERESSO: TOOLS OF COERCION

While individuals in Danderesso have different roles and responsibilities with regard to livelihoods, and these roles and responsibilities are legitimized through expectations of gender and seniority that transcend livelihoods activities, this convergence is not enough to produce the uniformity of identity-to-activity relationships that we see across Danderesso. Lurking in nearly every interview was a concern for living up to the expectations of one's identity that implied consequences for those that did not. By explicitly discussing some of the consequences of failure to comply with expectations of identity and livelihoods, we can more fully explain the decision-making that produces the observed patterns of livelihoods activity in Danderesso. This, in turn, helps us to better understand current patterns of advisory use in this village and livelihoods zone, and likely future patterns of use.

As noted repeatedly in the discussion of identity above, all residents of Danderesso are subject to the decisions of the oldest man in their concession. Residents of all genders and seniorities agreed that anyone who disobeyed or defied the directions of this man would face harsh consequences. The lightest of these was to stay behind in the house and not work on their field (mentioned by young men in Interviews 14, 15, and 20, junior women in Interviews 4 and 13, and a senior man in Interview 41). This is a significant sanction, for if residents (especially men) are barred from farming, they cannot meet their food provisioning responsibility to their household or the concession. Further, they cannot earn money that might allow for the future purchase of inputs, animals, or equipment that would allow them to meet these obligations in the coming year (emphasized by the senior man in Interview 41). A more harsh consequence for disobedience is removal from the concession and/or household entirely. The junior woman in Interview 1 captured this outcome most clearly when she argued that anyone who contradicts the head of concession or household, or does not do what is expected of them, will have to “find another house to live in. They are not welcome in the concession anymore.” This is a particularly harsh sanction, as the individual would lose access to land and the collective labor and resources of the concession or household, likely making life in Danderesso untenable. Other sanctions involved being beaten (mentioned by the junior man in Interview 43, the senior man in Interview 5, and the senior woman in Interview 38), and having the police called on them (the senior man in Interview 5).

Individuals of all genders and seniorities mentioned these as *potential* sanctions for disobedience, as such outcomes seem to be largely hypothetical. Two junior women (Interviews 4 and 17) claimed they could not imagine a scenario where they would ignore or contradict their husband or the senior man, and senior men (Interviews 3 and 5), junior men (Interviews 20 and 37), and a senior woman (Interview 7) noted that such disobedience had never happened. The interviews in Danderesso suggest that breaking with the decisions of the head of concession or household is not an acceptable action to anyone in the community, and one that would not be adopted under any normal circumstances. Further, to do so would result at least in being deprived of the right to work fields, if not being expelled from the concession, defeating the purpose of defying a senior man to improve one's livelihoods outcomes.

If seniority conveys certain expectations upon individuals with regard to their decision-making and authority, so too their gender produces other expectations that, when transgressed, can result in sanctions. Men, who are expected to work hard, feed their families, and provide resources to the household, will not find a wife or have a family if they do not live up to these expectations (senior men in Interviews 59 and 42). Those who are already married could have their wives leave (the young man in Interview 27), or at the very least men who do not provide for their households can lose their voice in the concession or household, such that their wives and children begin to ignore them (the young woman in Interview 44). The overall sentiment of the sanctions, however, seems best captured by the young woman in Interview 13, who said that a man who did not live up to expectations would “be worthless.”

For men in Danderesso, the intersecting tools of coercion around expectations of seniority and gender weave together a comprehensive framing of the world in which their roles and their responsibilities vis a vis others in their households or concessions become non-negotiable. A good man, at his core, provides for his household in various ways. Failure to do so will result in the rest of the concession and household starting to ignore him, and could result in his removal from decision-making or even the concession itself. Thus, senior men, while having all decision-making power in these concessions, must make good decisions that result in adequate food production, lest they fail to live up to expectations or cause the more junior men in their concessions to fail in this manner. On the other hand, if a junior man chooses to ignore or contradict his seniors, he will not be allowed to work, thus making it impossible to meet the obligations of his gender, likely causing him to lose status and eventually his family. Thus, all men must meet the obligations that are associated with their identity as it takes shape at the intersection of gender and seniority.

Women in Danderesso also live with particular expectations attached to their roles and responsibilities. Women’s duties lie principally in taking care of the household via domestic duties, childcare, labor supporting that of their husband, and general obedience to their husband. Women who fail to live up to this expectation expect that their husband will find another wife who will (senior men in Interviews 59, 56, 42, 41, and 3, junior women in Interviews 44 and 18, a senior women in Interview 38, and a young man in Interview 27). The loss of a husband would, for these women, result in the loss of access to land and other livelihoods resources, making life in Danderesso impossible. Less severe sanctions for failing to live up to these expectations, especially when women fail to demonstrate obedience to the men in their households and concessions, include beatings (mentioned by a young woman in Interview 34, a young man in Interview 27, and a senior woman in Interview 24) and confinement to the home as a form of social isolation (mentioned by a young woman in Interview 13). In the case of women, their seniority did not appear as a major factor in identifying situations where they might transgress expectations, nor did it seem to shape the form of sanction that they might face for such transgression. Obviously, how a woman lives up to her role as the person who “takes care of the household” will change with age and such factors as childbearing status, but there was no discussion of sanctions handed down by senior women to disobedient or otherwise transgressive junior women. Instead, the tools of coercion in Danderesso seem to be largely consistent across women of all seniorities, if the expectations of women vary somewhat over time.

In summary, the patterns of behavior exhibited in the agricultural livelihoods of Danderesso, while clearly a product of the interplay between identity-related roles and responsibilities and the different ways in which residents talk about and go about making a living in this community, are strongly reinforced by tools of coercion that draw upon both these discourses of livelihoods and these identities for legitimacy. For example, the ability to sanction someone for disobedience is closely tied to the expectations of gender and seniority in this community, while at the same time drawing upon the need for everyone to play particular roles to successfully make a living in this context. The patterns of behavior seen in Danderesso are unlikely to change easily, or without significant social stress.

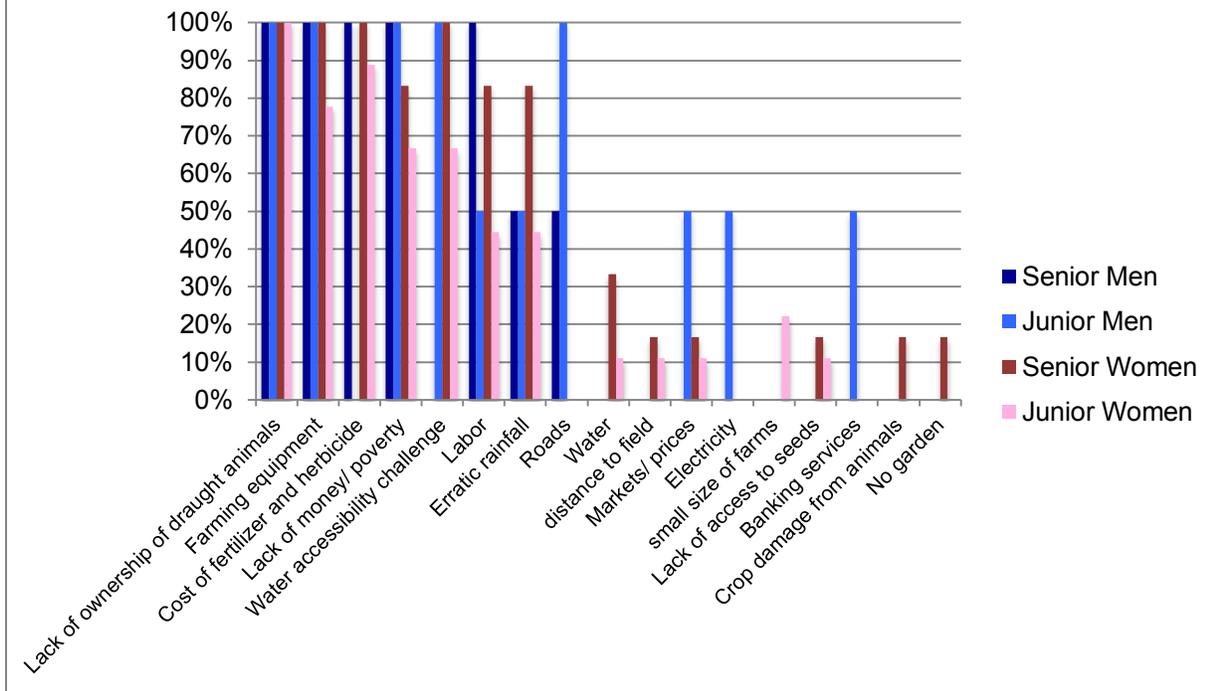
#### **5.1.4. DANDERESSO: DIFFERENT VULNERABILITIES, DIFFERENT DECISIONS**

In Danderesso, the intersection of three factors shapes individual vulnerability: gender, seniority, and access to the animals and tools that facilitate cultivation. The first two factors produce expected roles and responsibilities with regard to life in Danderesso, including livelihoods roles and responsibilities. Access to animals and equipment shapes the ways in which they can live up to those roles and responsibilities. As a result, somewhat unique assemblage of vulnerability emerge at the intersection of these three factors.

Nearly all those without access to animals or farming equipment (Figure 5.1.18) are so production-constrained that they are not concerned with gaining access to larger farms. The relatively high level of concern for access to draught animals, farming equipment, and adequate labor further drives home these constraints. But these constraints mean different things when filtered through the different identities of those in this group. For senior men, the lack of access to animals and equipment means they are challenged in meeting their fundamental responsibility to provide food and resources for their families through their labor and their decisions. This is why they are most concerned with access to the animals and equipment they need to boost agricultural production, the access to capital that might facilitate the acquisition of these animals and tools, and having access to adequate labor to enable production in the absence of these animals and tools.

Senior men without animals and equipment have a great deal of responsibility and authority, but are greatly constrained in living up to their roles and responsibilities. They are expected to work and make decisions that will feed their households and, when they are the most senior men in the concession, the concession for the entire year. However, they lack access to the animals and equipment that they need to maximize their production. Without these resources, they cannot cultivate cotton, and therefore cannot participate in the most lucrative form of agriculture available in the community. Instead, they are forced to fulfill their role by raising enough staple grain to feed the family. While these men might seem ideal targets for advisories, because they lack access to animals and equipment they cannot respond rapidly to information delivered through the advisory program. Instead, they must wait until their better-off neighbors have finished plowing their fields before they can respond. This may delay planting by several weeks. Further, these men lack access to the reserves of manual labor that might hand-prepare the fields rapidly. It is therefore impossible for these men to follow advisories that suggested the cultivation of long-cycle varieties of these staples, minimizing their yields even in agriculturally favorable seasons. These farmers are perhaps less impacted by adverse agricultural conditions, as they are already planting short-cycle, drought-tolerant varieties of their staple crops. Finally, these men tend to plant their crops sequentially, starting with maize before planting millet, sorghum, and peanuts. This further delays the planting of several grains. The impact of this is evident in these men's crop variety selections, which appear to shift more and more to short-cycle as farmers plant their way down the continuum of crop desirability. Senior men without animals and equipment cannot act on the advisories in a manner that makes the information they deliver useful, and therefore the biggest impact of being unable to use the advisories for these men is likely lost production in favorable seasons.

## Danderesso sub-group vulnerabilities: Without animals or equipment



**Figure 5.1.18: Reported assemblages of vulnerability for those without access to animals or equipment by gender/seniority cohort.**

Junior men, while responsible for contributing to the well-being of their concession and their household, are not subject to this responsibility to the same degree. Because this allows them to market some surpluses, and cultivate crops specifically for market sale, they have much greater concern for water access (to water garden crops for market sale), the condition of the roads network on which they rely to sell those crops, the markets for those crops, and even the banking services that might facilitate cash transactions and savings. They are less concerned about access to labor than senior men, perhaps because they are themselves are the labor pool for those senior men.

Junior men, while having authority over the women in their households, have little agricultural (or indeed livelihoods) decision-making power. Generally, senior men dictate the staple grains to be grown, the varieties to be selected, and the time of planting. Therefore, while junior men without animals and equipment are subject to the same labor and time constraints as senior men in the same situation, they have *neither* the authority nor the means to act on advisories that are aimed at staple grains. In short, the overall utility and lost impact of advisories is for junior men without animals and equipment is currently about the same as for senior men in the same situation, simply because these senior men make the agricultural decisions that advisories might inform. These junior men do have some latitude with regard to their production, as they are not as responsible for the overall food security of the members of the concession as senior men. This latitude, however, is generally expressed in the planting of marketable vegetables for which there are no advisories, and which can be grown outside the main planting season.

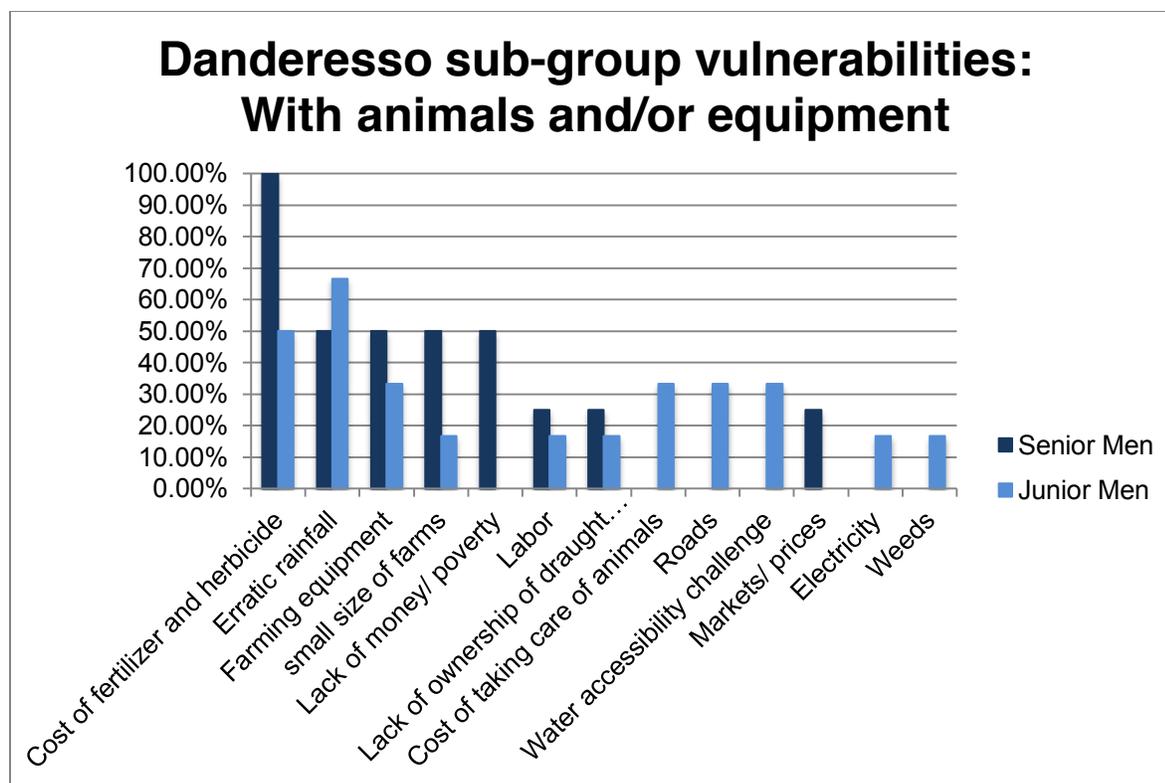
On the whole, women are less concerned than men about access to adequate income and working capital, and access to labor that might increase their yields and incomes, because beyond a small amount any surplus income is likely to be appropriated by men. Further, women are highly time-constrained by

domestic duties and the support of men's agricultural activities, making the cultivation of larger farms very difficult. Senior women are more concerned with rainfall and access to labor than junior women, likely because their husbands are more likely to have greater responsibilities for meeting the overall needs of the concession and household. Similarly, junior women's relative lack of concern for labor and rainfall, which closely mirrors the level of concern among junior men, might reflect their heavy dependence on their husbands and the more senior men in their concession for decision-making.

Women without animals and equipment have agricultural authority and responsibility, but only over rice production. These women do not make agricultural decisions over the production of staple grains, instead working on the fields of their husbands and the men of their concession. As discussed above, in concessions that lack animals and equipment, agricultural activities are generally delayed into the season. By the time women turn to rice production, which appears to be somewhat autonomous, most of the season has already passed, and they have few decisions to make regarding variety selection – simply put, they have to plant short cycle to have any harvest at all. Therefore, women lack the authority and the means to act on advisories for most staple grains, and while they might have the authority to act on rice advisories (were such advisories to exist), the delays in planting they face as they fulfill their role as a “good woman” in both supporting men's agricultural production and meeting expectations of domestic labor make such decisions moot.

Those with access to animals and equipment have greater capacity to meet the expectation of food and material provision attached to their gendered identities (Figure 5.1.19). However, these expectations are modified by seniority. Senior men are more concerned with inputs, farm size, and lack of money because they are responsible for ensuring that the family has enough to eat. This is why, with the exception of cotton, they are largely growing crops for subsistence, making large yields critical to their supply of food and income.

Senior men with access to animals and equipment have the authority and the means to use existing advisories. Two of the four senior men in this sample who had the means to respond to advisories reported using them. It is clear that while some of these men find the advisories useful, others still trust their local indicators of seasonal change to guide their decisions. For example, one senior man with animals and equipment said he used local indicators to determine when to plant his crops. He watches the trees in the fields, and when the leaves drop he know the rain are coming and farming will begin soon thereafter (Interview 3). It is not clear if this man thinks that the advisories are less useful than the local indicators, or if he lacks access to the Danderesso rain gauge data that would make the advisories meaningful. However, the fact that men who use the advisories tend to follow them very closely suggests that they do provide meaningful information. This, in turn, suggests that those not using the advisories either do not understand them, or lack access to the rain gauge data needed to make these meaningful. It is also possible that, because the central rain gauge in the village was broken, some of these men did not know about the other rain gauge used by the farmer observer for the advisories, and assumed the information was no longer available.



**Figure 5.1.19: Reported assemblages of vulnerability for those with access to animals or equipment by gender/seniority cohort.**

Junior men, while working family fields, are not personally responsible for food supply in the same way as senior men. As a result, they can focus their own production on non-staple crops to a somewhat greater extent, enabling the growth of market crops like sweet potatoes. As with junior men without access to animals and equipment, they are more concerned with roads that affect their market access than senior men, but not at all concerned with lack of money as a constraint. This is likely because these junior men are in a situation where they are already building assets that will secure their material and social situation in the future.

Junior men with access to animals and equipment usually lack the authority to make decisions about agricultural strategy, and therefore cannot act on the advisories directly unless they live in a concession where the senior man uses the advisories. Generally speaking, these men are very subsistence-oriented in their staple grain production, though access to advisories appears to result in small surpluses that are marketable. However, the cultivation of cotton by these junior men provides income that enables the production of a significant amount and range of non-staple fruits and vegetables. Junior men appear to have some control over the activities around these non-staple crops, but there are no advisories for them to follow.

#### **5.1.5. DANDERESSO: EXPLAINING EXISTING ADVISORY USE**

The foregoing discussion of groups with shared assemblages of vulnerability suggests another way to examine the advisory use data from 2014. When we consider advisory use by these groups, it is clear that access to livelihoods resources like agricultural equipment and draught animals is an important factor shaping the use of advisories (Figure 5.1.20). In Danderesso, half of those with animals and equipment are using the advisories directly. One of these, a junior man (Interview #27), listened to the advisories and also consulted with the village extension agent, who managed the rain gauge. Of those without

draught animals and/or farming equipment, however, only 10.5% are following advisories, while a single junior man (Interview #43) was consulting the village extension agent for the advisories. Clearly, access to livelihoods resources greatly shapes the uptake of advisories.

	Follows advisories/ forecasts	Receives advisories from extension agent
Without animals and/or equipment	10.5%	5.3%
With animals and equipment	50.0%	10.0%

**Figure 5.1.20: Rates of advisory use in Danderesso, by vulnerability group.**

However, a deeper dive into the use data gathered in 2014 demonstrates the importance of the roles and responsibilities associated with particular intersections of gender and seniority in also shaping the use of advisories. While those without animals and/or farming equipment overall have low rates of advisory use, half of both senior men and junior men are using advisories, while only a single junior woman (Interview #16) was using them. Among men, the rate of advisory use was the same across seniorities and across the two vulnerability groups. This suggests that men control enough livelihoods resource, even when lacking the animals and equipment they need, to at least partially respond to the advisories. Women, on the other hand, cannot access these resources until it is too late in the season for advisories to usefully inform agricultural strategy.

Finally, the farmer observer in Danderesso reported that only a few men and women came to the committee where he gathered and disseminated this information. The men were mostly wealthy and prominent members of the community, and the women never spoke. It was his impression that these people did not share the information more broadly in the village.

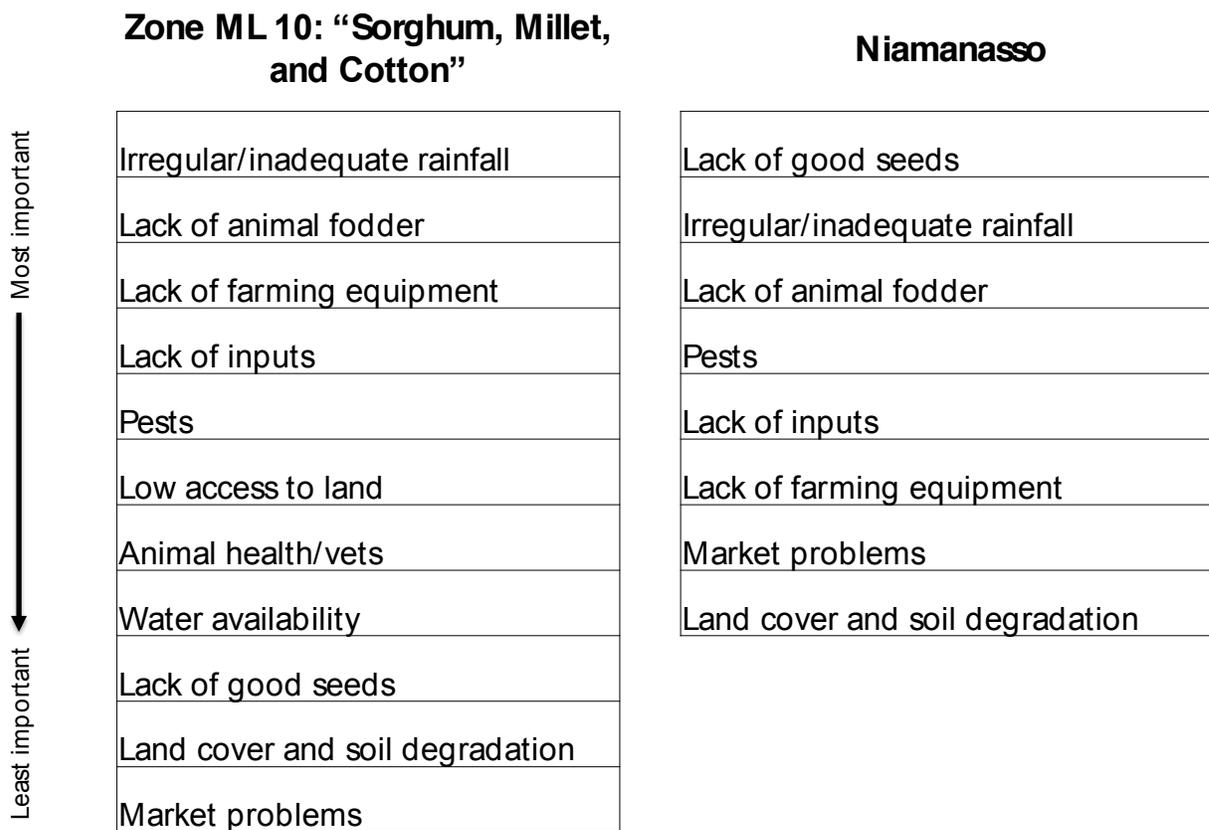
## 5.2. NIAMANASSO/ZONE ML 10

Niamanasso is a village in the commune of N'golonianasso, in the Cercle of Koutiala in the Sikasso Region (Figure 5.2.1). Located 9km south of N'golonianasso and 22km west of Koutiala, the village is representative of Cluster 4, livelihoods zone ML 10, “Sorghum, Millet, and Cotton.” According to Mali’s 2009 census, Niamanasso was home to 2698 people (1340 men, 1358 women) organized into 166 concessions and 377 households for an average of 2.3 households per commune, and 7.2 people per household.



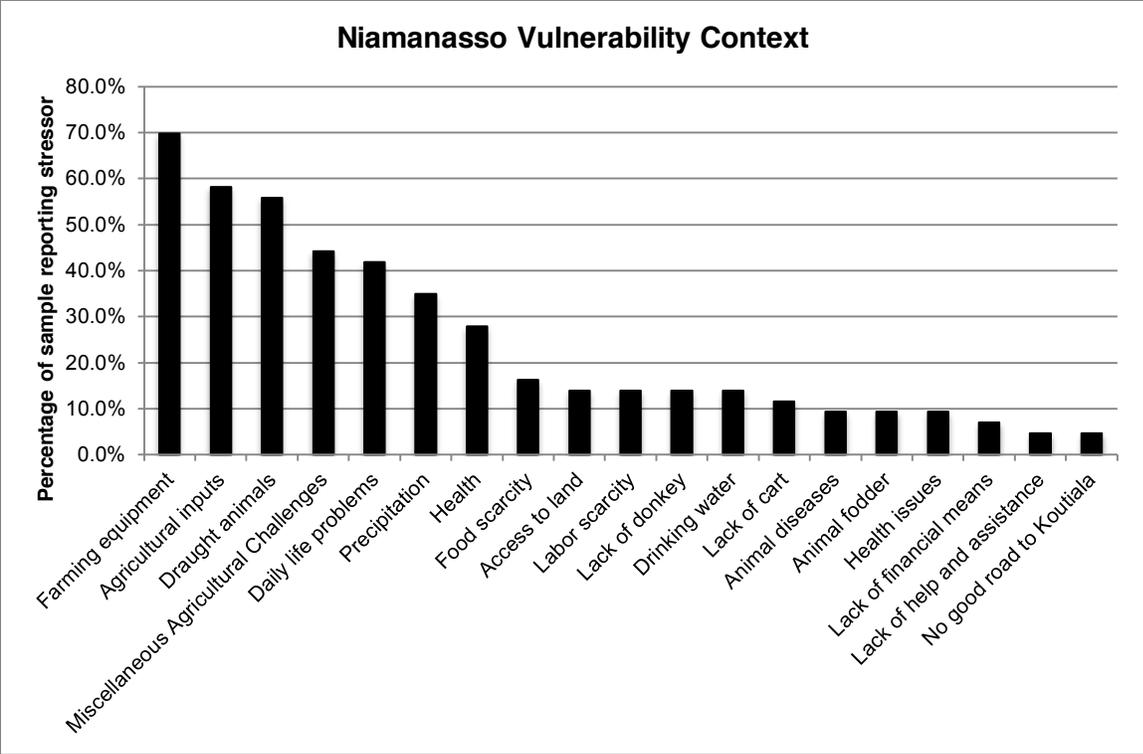
**Figure 5.2.1: Locator map of Niamanasso, and Zone ML 10. This map represents the assessments interpretation of the boundaries of this zone, and also includes the area where Zone ML 10 unevenly shades into Zone ML 11. Map credit: Christopher J. Witt, Department of Geography, University of South Carolina.**

Zone ML 10 receives 700mm-1100mm of rain annually. Nearly all precipitation falls in the May to October rainy season, and most arrives between June and the end of August. Overall, this zone is seen as a food surplus area in which many farmers are engaged in marketing their crops. Further, Dixon and Holt (Dixon and Holt, 2010, p.93) note that the residents of this zone trade agricultural products in markets not only in Mali, but also in Burkina Faso, Cote d’Ivoire, and Senegal. The wealthiest households use livestock as critical sources of traction for field preparation, sources of manure for fields, and (at least in the case of donkeys) as sources of transportation. For these households, animal sales are a means of purchasing farm supplies and inputs to facilitate their agricultural production. The poorest households in this zone have relatively few animals, principally poultry. These households use animal sales to purchase food during the hungry season, which starts in early June and continues until crops are harvested late in August. These poorer households gather wild foods to mitigate the challenges of the hungry season (Dixon and Holt, 2010, p.93-96). According to Dixon and Holt, other key challenges in this zone include pests that attack crops, late payments for cotton by CMDT, timely access to adequate inputs, irregular rainfall, access to adequate water, a lack of pastureland, cattle theft, and malaria. The 2012 preliminary assessment largely confirmed this reading of the Zone’s vulnerability context. Figure 5.2.2 is a qualitative representation of the of the stressors mentioned by respondents in the villages of Zone ML 10 with access to advisories, and those of the residents of Niamanasso specifically, from most to least important.



**Figure 5.2.2: A qualitative ranking of stressors in Zone ML10, and in Niamanasso specifically, from the 2012 preliminary assessment.**

Figure 5.2.3 represents a much deeper analysis of the vulnerability context of Niamanasso gathered in 2014 through semi-structured interviews with 43 residents of the community. Each of these individuals was interviewed twice, once to establish their vulnerability context and livelihoods, and a second time to follow through the LIG framework and understand the decisions that led to these vulnerabilities and livelihoods outcomes. This detailed assessment aligns with the findings of the preliminary assessment for both zone ML 10 and for Niamanasso specifically. For example, issues of rainfall scarcity and timing, access to adequate farming equipment, and access to adequate inputs are significant stressors that are found across all three sets of data.



**Figure 5.2.3: Stressors in the vulnerability context of Niamanasso, gathered during 2014 fieldwork.**

The preliminary assessment of advisory use (Carr, 2014a) found that while issues of the timing and amount of precipitation are clearly part of this zone’s vulnerability context, few of those with access to the advisory data employed them in their decision-making. Across this zone, men were much more likely than women to claim they were using the advisories, with junior men the most likely to make this claim. However, using their ability to explain how the program worked as a gauge of real advisory use, it appears that only around 15% of men, and a very small fraction of women, actually use the advisories (Figure 5.2.4).

Zone ML 10: "Sorghum, millet, and cotton"

	Aware of program	Follow advice	% likely using
GLAM senior men	65.00%	45.00%	16.25%
GLAM senior women	44.44%	11.11%	0.00%
GLAM junior men	85.71%	80.95%	14.41%
GLAM junior women	25.00%	25.00%	6.25%

**Figure 5.2.4: Rates of use of agrometeorological advisories in zone ML10, from the 2012 data.**

During the 2012 assessment, the field team interviewed a group of residents that appeared to show a very high level of use of the advisories among men in Niamanasso, with all of the junior men interviewed appearing to use the advisories (Figure 5.2.5). One of the five senior women interviewed appeared to be using the advisories. In this regard, Niamanasso was something of an outlier in Zone ML 10, where rates of use were otherwise quite low, even among men.

Niamanasso

	Aware	Claiming use	Likely Using
Senior man	80.0%	80.0%	80.0%
Senior woman	40.0%	20.0%	20.0%
Junior man	100.0%	100.0%	100.0%
Junior woman	20.0%	0.0%	0.0%

**Figure 5.2.5: Rates of advisory use in Niamanasso, from the 2012 data.**

In 2014, interviews with members of the community (n=43) showed that 23.3% of the sample (n=10) were using the advisories, either by reading the rain gauge themselves (11.6%) or learning about the advisory and its recommendations from someone else (11.6%). In this sample, 38.5% of senior men (n=5), 30% of junior men (n=3), and 14.3% of senior women (n=2) reported using the advisories. No

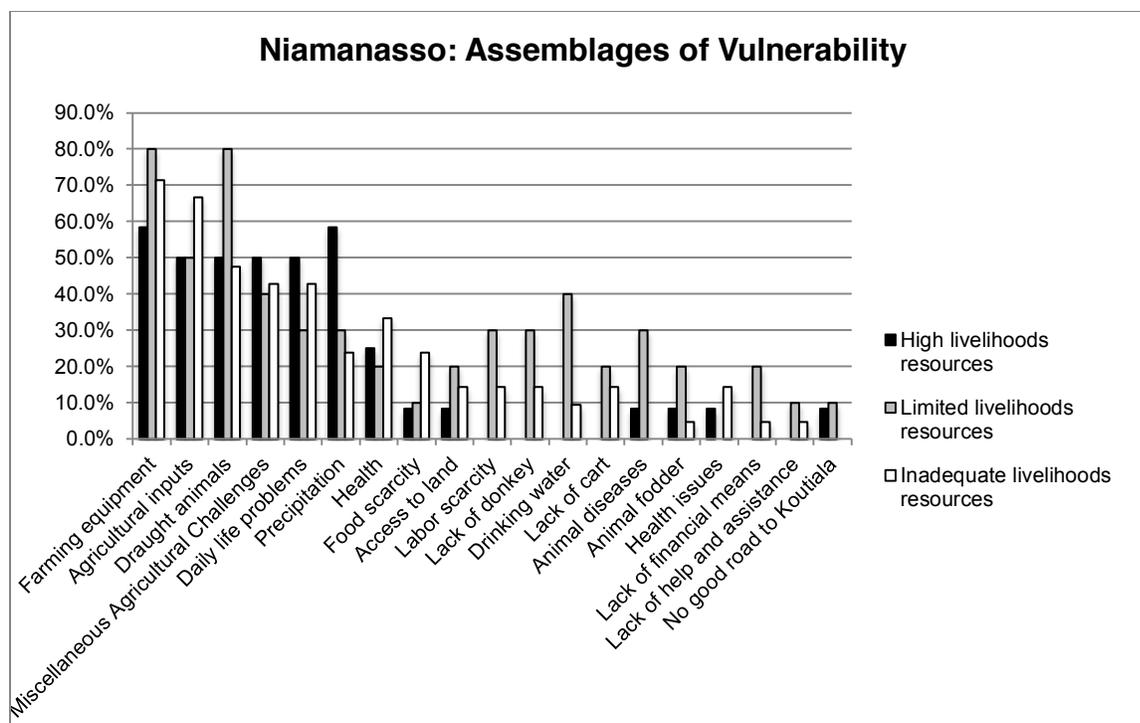
junior woman reported using the advisories. While lower than the reported rates of use in 2012, these are the highest rates of use seen in any part of southern Mali during the 2014 fieldwork.

Just as advisory use is not uniform in Niamanasso, so too the experience of the vulnerability context is not uniform. In 2012 the village sample was stratified using a priori assumptions about the factors that most influenced decision-making capacity (gender and seniority), as the Mɩnyanka-speaking Senafo residents of these villages tend to follow this broad structure of authority. In 2014 the field team used the more nuanced LIG approach to divide the community into groups by shared assemblages of vulnerability. The team found that the community broke into three groups (Figure 5.2.6):

**The High Livelihoods Resource group** is comprised of individuals who are primarily farmers but have second livelihood activities such as selling animals, gardening, formal employment, work as traditional healers, or serve as imams. Members of this group own farming equipment and draught animals. Further, they have the assets, such as animals, needed to sell and raise the funds for investment in inputs.

**The Limited Livelihoods Resource group** is comprised of those who farm as principal livelihood activity, but these individuals also sell animals (goats, sheep, poultry, but not cattle). Members of this group don't own all of the farming equipment or animals they need, and often rent or borrow the equipment and draught animal from neighbors or relatives. Some moved from other villages and do not own land in Niamanasso.

**The Inadequate Livelihoods Resource group** is comprised primarily of farmers, but members of this group also run small businesses such as selling crops, shea butter, and smaller animals like goats, sheep, poultry. Members of this group have no farming equipment and rely entirely on their spouses, relatives, and neighbors to plow their fields.



**Figure 5.2.6: Assemblages of vulnerability associated with the three groups in Niamanasso described above.**

### 5.2.1. IDENTITY IN NIAMANASSO

Within each of the groups described above, different individuals play different social roles, and have different responsibilities. These roles and responsibilities shape their ability to make livelihoods decisions, including agricultural decisions, and therefore influence their ability to use agrometeorological advisories. As discussed above, in Niamanasso and in Zone 10 more generally, gender and seniority are the principal social determinants of the roles associated with individuals, and the responsibilities that proceed from those roles.

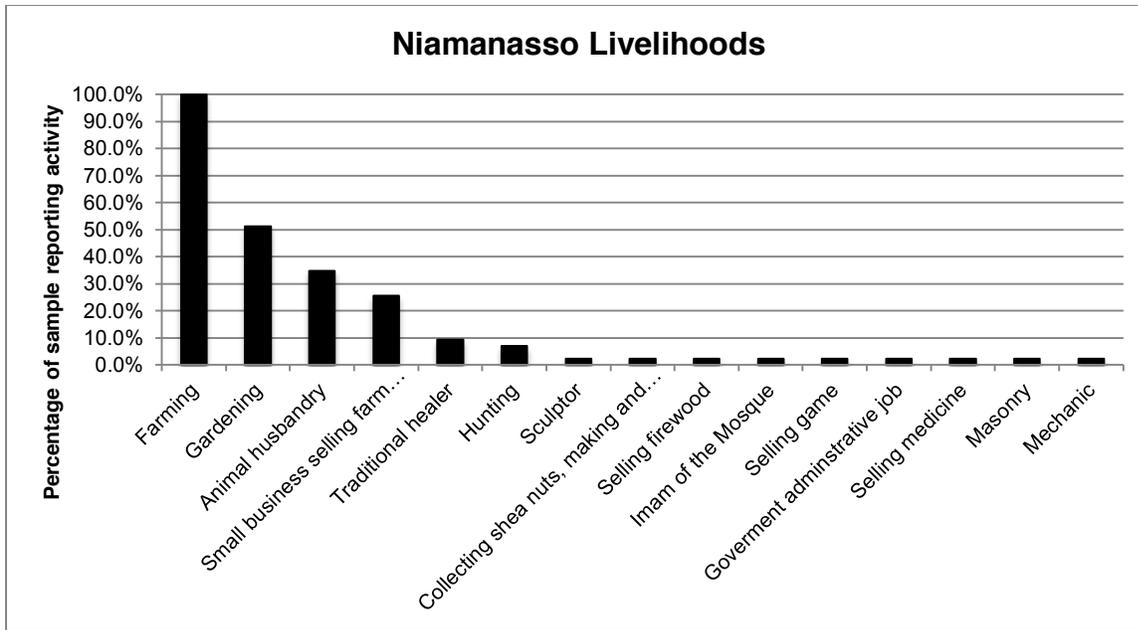
In Niamanasso, a man’s role is the provider, someone who can feed his family and financially support their needs. He should do this through hard work, work that he can be proud of (junior man in Interview #32). Men are expected to provide the inputs needed for the family farm, and to farm and garden themselves. They provide land for their wives, and provide the traction their wives need to plow their fields (junior women in Interviews #4 and #6, senior woman in Interview #33). In general, men are expected to make decisions for their families. These include decisions about agriculture, animal husbandry, and the use of household and family assets. A senior man experiences particular pressure in this responsibility, as his decisions will shape the agricultural outcomes of his entire family. Senior men are expected to be good examples for others in the community, to be honest and otherwise of good character. They are also expected to deal with all members of the family fairly. A senior man must remain personally productive, even if his children are taking care of him (junior man in Interview #10). This speaks to the importance of the responsibility to produce food as a part of a man’s identity, even when he ages and such labor becomes difficult. One junior man (interview #25) noted that his definition of a “bad” senior man was one that does not do any work, and that does not give good advice to his children, reinforcing the centrality of these two responsibilities to the role of senior man in Niamanasso.

Junior men, while expected to be hard workers, are perhaps most expected to be respectful of those senior to them. In short, they help ensure the well-being of the family by executing the instructions and advice of the senior man or men in the family. While senior men, due to their role as decision-makers, have greater decision-making responsibilities, junior men also make decisions, at least for their own households.

The fact that interviews with the residents of Niamanasso did produce a clear distinction between the role of a woman and the role of a wife speaks to the strong convergence of these identities for adult women. It is also interesting that residents drew little distinction between the roles of junior and senior women. In general, a woman's role is to be a wife and mother, and to respect her husband, obey him, and to generally take care of the family. The expectations of respect and obedience create a situation where women are not responsible for livelihoods decision-making. As one senior woman (Interview #13) noted, if the decisions of the head of the household are questioned he takes time to discuss with his children and his wife, but the final decision, and responsibility for that decision, belongs to him. Women are expected to work on the family farm first, and their own farms in whatever time remains (senior woman in Interview #3, junior women in Interviews #5 and #29). Another junior woman (Interview #28) argued that women have the time to plant their own fields when their husband gives them free time. Should their agricultural or other activities succeed, however, women do make decisions about how to spend their own money, generally because this income is relatively small and therefore not enough to be worth sharing with the husband and family (senior woman in Interview #32). As the senior woman in Interview #13 noted, women generally expected to give a symbolic amount of money from these activities back to their husbands to fulfill a cultural obligation. The junior woman in Interview #26 interpreted this as a requirement of Islam. Women use the income from their activities to purchase inputs, such as fertilizer or pesticide, for their fields.

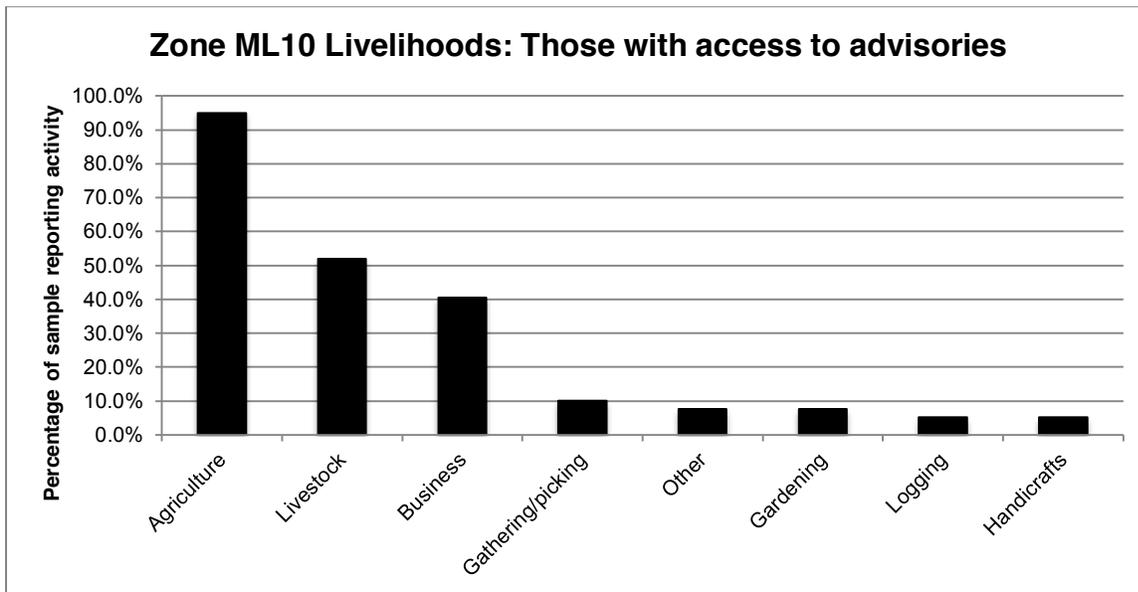
### **5.2.2. LIVELIHOODS IN NIAMANASSO**

In Niamanasso, residents engage in agriculture-centered livelihoods, with the two most commonly-reported activities being rain-fed agriculture and gardening (Figure 5.2.7). Animal husbandry is the third most-commonly referenced activity. Even the most common business activity is the marketing of farm products. While residents also reported a wide range of nonfarm activities, but nearly all such activities were conducted by an individual and do not represent a village- or zone-level industry.



**Figure 5.2.7: The livelihoods activities reported by residents of Niamanasso in 2014.**

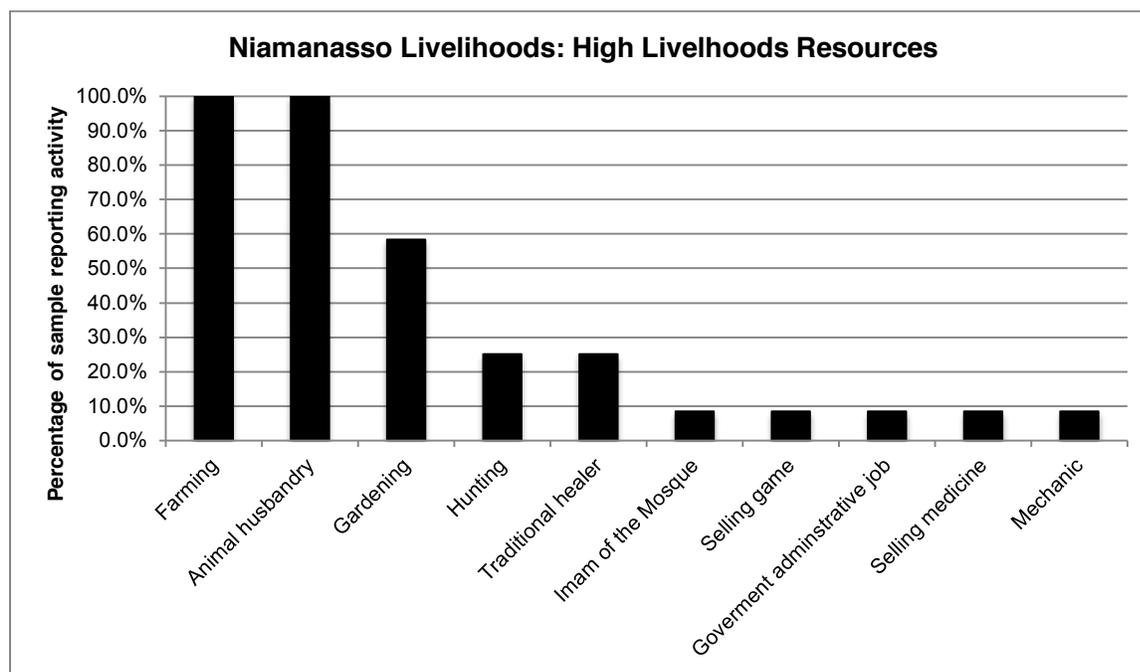
The pattern of participation in livelihoods activities in Niamanasso recorded in 2014 closely mirrors that in the larger livelihoods zone gathered during the preliminary assessment in 2012, with the key exception that gardening appears to be very underreported in the 2012 data (Figure 5.2.8). While gardening was not reported frequently as an activity in 2012, the crops that were reported as under cultivation in 2012 included a large number of garden crops, including lettuce, okra, onions, peppers, and tomatoes. This suggests that the 2012 figures underrepresented the amount of gardening taking place in this livelihoods zone, and that Niamanasso is very representative of the livelihoods in the zone as a whole.



**Figure 5.2.8: The livelihoods activities reported by residents of Niamanasso in 2012.**

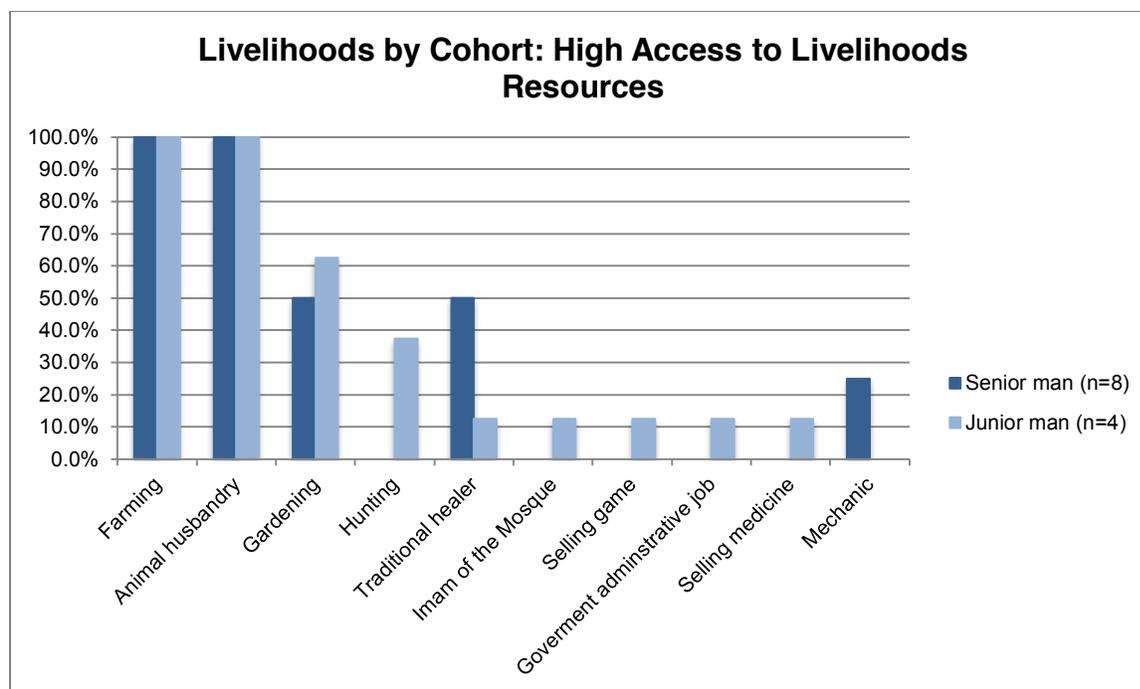
- 5.2.2.1 Those with High Livelihoods Resource Access

In Niamanasso, those with the highest access to livelihoods resources have strongly agriculture-centered livelihoods (Figure 5.2.9). This group reports the highest rates of participation in gardening. This is interesting because the group is exclusively men, and gardening is often seen as a woman’s activity in southern Mali. This group has the highest rate of animal husbandry in Niamanasso, and the highest rate of participation in non-farm employment (75.0%).



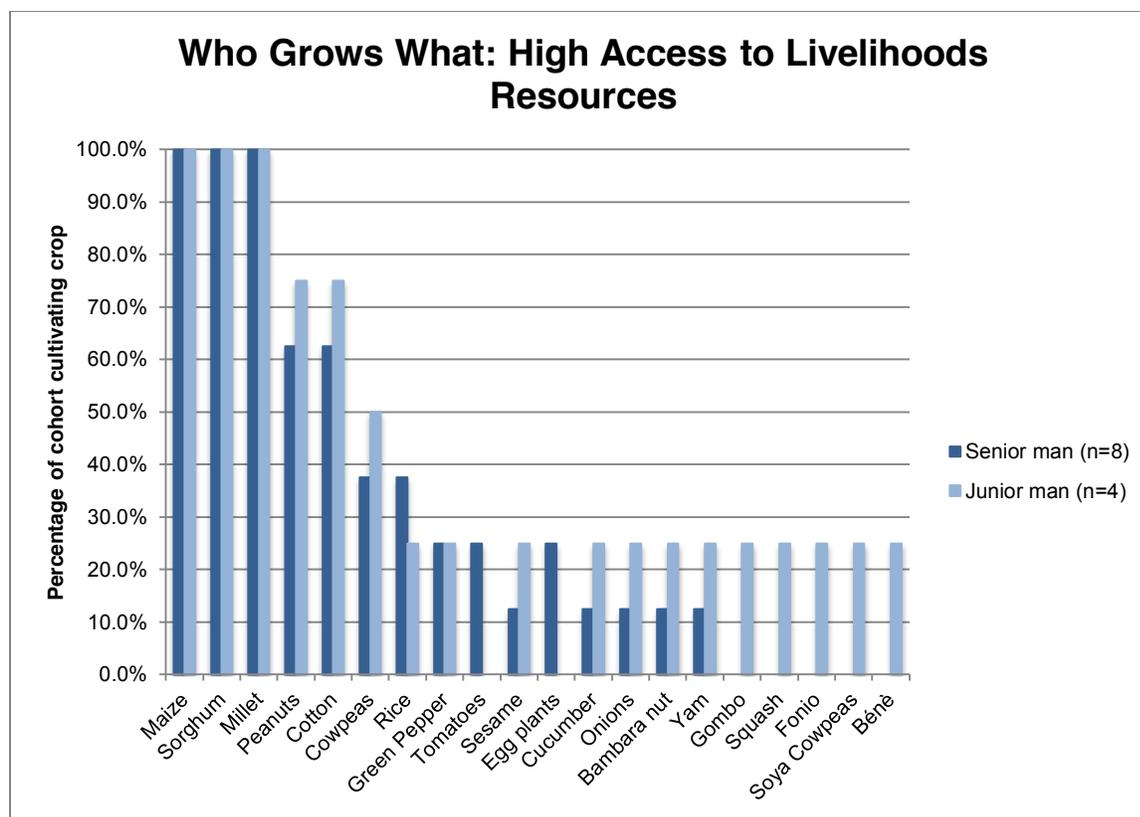
**Figure 5.2.9: The livelihoods activities reported by members of the High Livelihoods Resource Access group in 2014.**

While this group contains junior and senior men, when we examine reported livelihoods activities by different seniority, we see few differences (Figure 5.2.10). Overall, 75% of both junior and senior men reported participating in some form of non-farm employment. The only major difference between these groups is that a surprisingly large percentage of the senior men worked as traditional healers, far more than among junior men.



**Figure 5.2.10: The livelihoods activities reported by junior and senior men in the High Livelihoods Resource Access group in 2014.**

When we look at crop selection as divided between junior and senior men, again we see very little difference (Figure 5.2.11). The slightly higher rates of cultivation of crops such as sesame, cucumber, and onions by junior men is a product of the fact these junior men participate in gardening at a slightly greater rate than senior men. However, there is little to suggest that this difference represents any meaningful variation in crop selection by seniority. In general, men in this group see agriculture as the activity in Niamaasso that brings in the most income (senior man in Interview #15) and an appropriate activity that supported their parents and others that came before them (senior man in Interview #16). Gardening is conducted out of the regular agricultural season, as a means of raising income to meet household needs (junior man in Interview #42). There does not appear to be any association of gardening with gendered roles in Niamaasso. Throughout the sample interviewed in 2014, no man called gardening a woman’s activity. One senior man (interview #24) noted that cowpea, peanut, and rice harvests were generally for women, but none of these is a garden crop. Men who were not gardening generally explained this decision as the product of a lack of space in their fields for a garden, as opposed to the result of a social prohibition.



**Figure 5.2.11: The crop selections of senior and junior men in the High Livelihoods Resource Access group in 2014.**

The similarities between the crop selections of junior and senior men in the High Livelihoods Resource Access group are reinforced by the patterns of crop use that these men reported (Figure 5.2.12). We have very little data on crop use from junior men from the 2014 sample, with only two junior men providing information on why they cultivated the crops on their farms. The 2012 data suggests that the patterns of use represented in Figure 5.2.12 are a bit more conservative than the norm for junior men, in that in 2012 junior men cultivated sorghum, millet, and peanuts to eat more than sell, which suggests they expected a marketable surplus. In 2014, the one junior man who responded for the use of these crops was completely subsistence-focused, likely representing his personal view and situation, instead of that of junior men as a whole. If the 2012 data is in fact representative of junior men, there is little difference in the agricultural component of the livelihoods strategies of junior and senior men in this group. These men cultivate maize as a subsistence crop, only selling it, as one senior man (Interview #15) said, when there is enough to eat. Other staple crops, such as sorghum and millet, are viewed in the same manner. For example, the senior man in Interview #14 noted that his millet production is completely consumed because his family is large and, at times, his millet production is inadequate to feed them. The senior man in Interview #15 noted that he would only sell millet if he had enough to eat, or if he had to address medical bills. While the field team gathered little direct data on the use of garden crops such as eggplant, cucumber, okra, and squash, these appear to be sold to meet household needs (junior man in Interview 42).

## Crop Use: High Livelihoods Resources

Maize	Avg	Interpreted value	n=
Senior man	1.71	Eat more than sell	7
Junior man	1.50	Eat more than sell	2
Senior woman	n/a		
Junior woman	n/a		

Sorghum	Avg	Interpreted value	n=
Senior man	2.14	Eat more than sell	7
Junior man	1.00	Eat all	1
Senior woman	n/a		
Junior woman	n/a		

Millet	Avg	Interpreted value	n=
Senior man	1.86	Eat more than sell	7
Junior man	1.00	Eat all	1
Senior woman	n/a		
Junior woman	n/a		

Peanuts	Avg	Interpreted value	n=
Senior man	3.50	Sell more than eat	4
Junior man	1.00	Eat all	1
Senior woman	n/a		
Junior woman	n/a		

Cotton	Avg	Interpreted value	n=
Senior man	5.00	Sell all	4
Junior man	5.00	Sell all	1
Senior woman	n/a		
Junior woman	n/a		

Cowpeas	Avg	Interpreted value	n=
Senior man	1.33	Eat all	3
Junior man	n/a		
Senior woman	n/a		
Junior woman	n/a		

Sesame	Avg	Interpreted value	n=
Senior man	4.00	Sell more than eat	1
Junior man	1.00	Eat all	1
Senior woman	n/a		
Junior woman	n/a		

Bambara nuts	Avg	Interpreted value	n=
Senior man	1.00	Eat all	1
Junior man	n/a		
Senior woman	n/a		
Junior woman	n/a		

Fonio	Avg	Interpreted value	n=
Senior man	n/a		
Junior man	1.00	Eat all	1
Senior woman	n/a		
Junior woman	n/a		

Green pepper	Avg	Interpreted value	n=
Senior man	5.00	Sell all	1
Junior man	4.00	Sell more than eat	1
Senior woman	n/a		
Junior woman	n/a		

Tomato	Avg	Interpreted value	n=
Senior man	2.00	Eat more than sell	1
Junior man	4.00	Sell more than eat	1
Senior woman	n/a		
Junior woman	n/a		

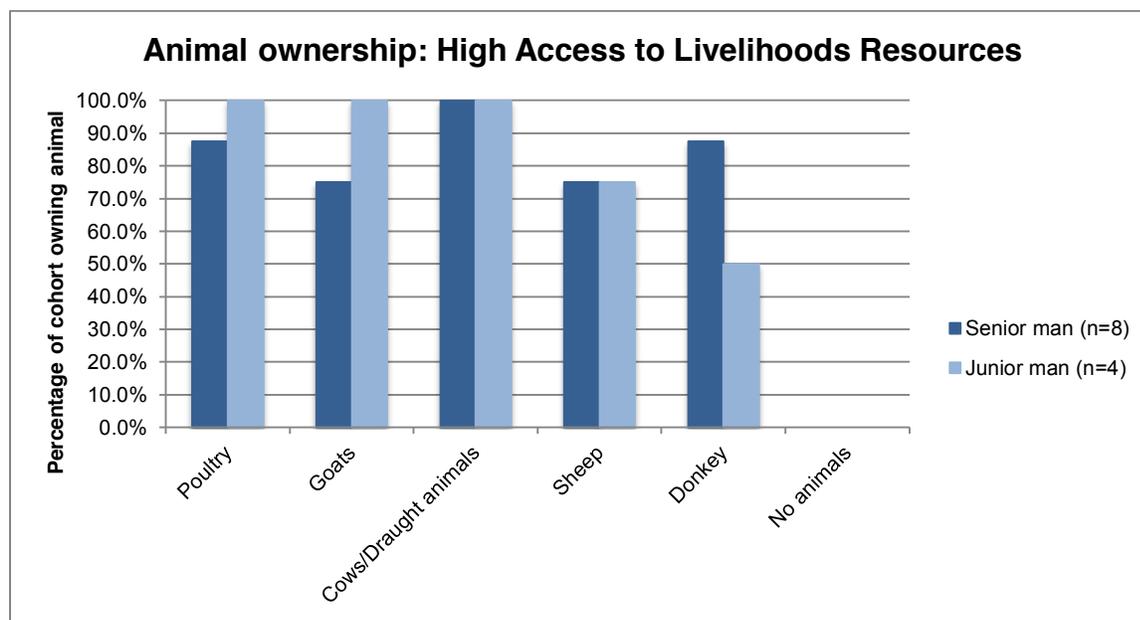
Eggplant	Avg	Interpreted value	n=
Senior man	4.00	Sell more than eat	1
Junior man	4.00	Sell more than eat	1
Senior woman	n/a		
Junior woman	n/a		

**Figure 5.2.12: The uses for cultivated crops in the High Livelihoods Resource Access Group in 2014, divided by gender/seniority cohorts.**

Those in the High Livelihoods Resource Group generally planted 100 day or longer cycles of their staple grains. Among senior men, the millet focus was on 120-day cycles, with one man hedging by using a 90-day cycle as well. Sorghum selection was evenly split between 120-day and 120-130 day cycles. 83% of senior men planted 100 to 110 day cycles of maize, with two men hedging this selection by also cultivating 90-day cycles. The only deviation from this pattern was for peanuts, where senior men cultivated an unknown variety that they claimed was short-cycle, though they did not specify the length. Junior men in this group followed a very similar pattern, with a slightly greater focus on the slightly longer cycle for sorghum. The fact there is some hedging behavior demonstrates that these men recognize the possibility of a disrupted or shortened growing season. However, it is clear from these

selections that all of these men are confident enough in their timing of the season that they can plant long-cycle varieties and reap the benefits of their greater productivity.

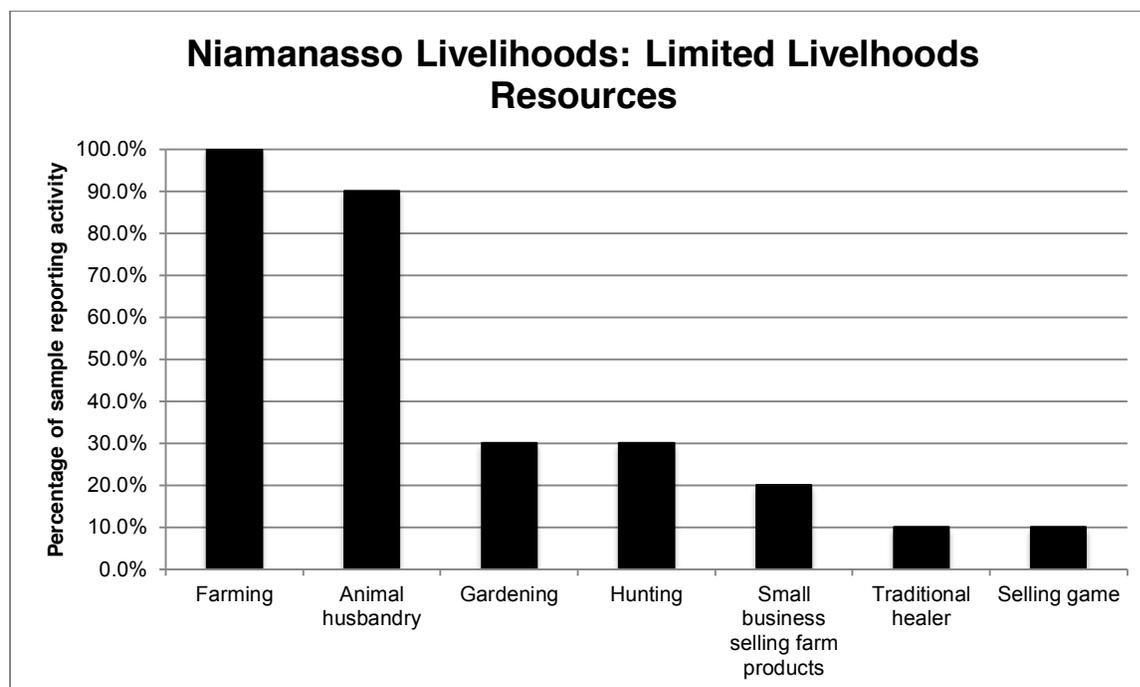
The men in this group had the highest rates of ownership of every animal reported in Niamanasso, and every man in this group reported owning at least one of these animals (Figure 5.2.13). Once again, the rates of ownership of these animals are very similar across junior and senior men, reinforcing the absence of seniority-based differences in agricultural strategy among of these men. These men see poultry as food for the family (junior men in interviews #2, #8, #10, senior men in interviews #11, #14, #16, #18), as food for visitors (junior men in interviews #2, #8, senior men in interviews #14, #15, #16, #19, #24), a source of cash for household needs (junior men in interviews #2, #8, #10, senior men in interviews #11, #14, #15, #18, #19, #24), a source of eggs (senior men in interviews #14, #15, #18, #19), and traditional healing (senior man in interview #14). Donkeys are principally sources of transportation for inputs, but are also used to move people and firewood (junior man in interview #2, senior men in interviews #11, #14, #18, #19, #24). Goats and sheep are generally used for the same purposes. They are commonly sold for cash that is used for basic needs (junior men in interviews #2 #8, #10, senior men in interviews #11, #14, #15, #24), for ceremonies like Tabaski and Ramadan (junior man in interview #10, senior men in interviews #14, #15, #16, #18, #19, #24), and much more rarely for food (junior men in interviews #8, #10, senior man in interview #11). Cattle are used principally for plowing, with milk and dairy products a secondary benefit. Cattle are only sold when they are old or sick (junior man in interview #2), or if the owner is in financial distress (junior man in interview #10, senior man in interview #14). Generally, however, these men argued that the proceeds from the sale of cattle should be reinvested in agricultural activities. For example, the junior man in interview #8 said he would sell his cattle if he had to invest in agriculture after a failed season (see also the senior man in interview #14). One junior man (interview #10) used his cattle as source of fertilizer for his fields.



**Figure 5.2.13: The rates of animal ownership of senior and junior men in the High Livelihoods Resource Access group in 2014.**

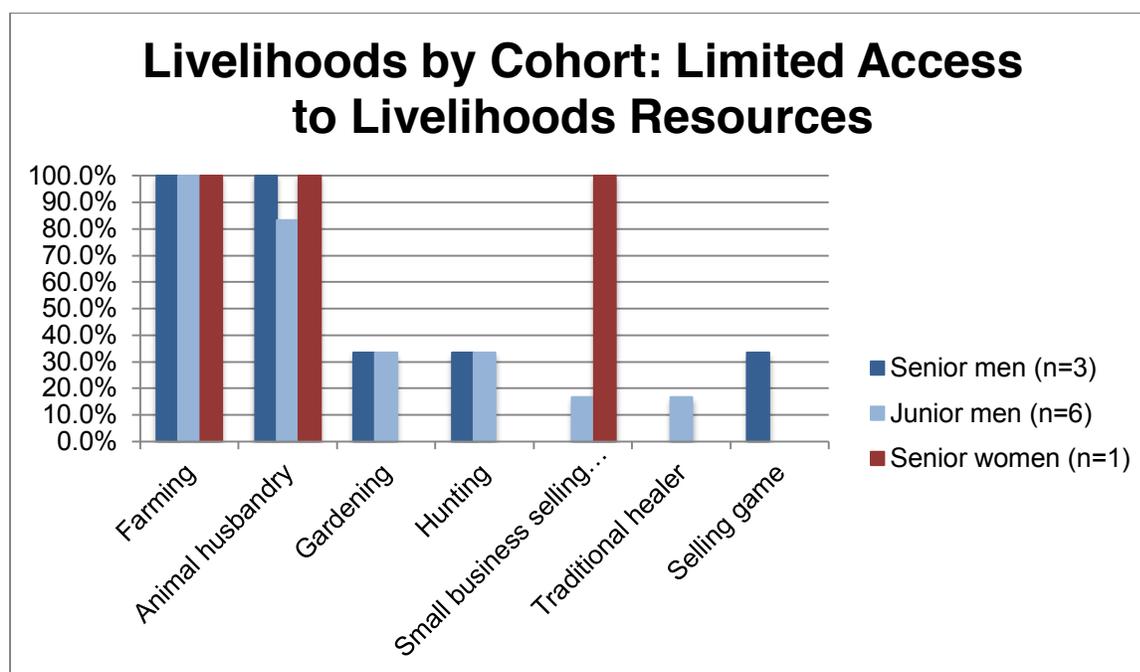
- 5.2.2.2 Those with Limited Livelihoods Resource Access

Those in Niamanasso with limited livelihoods resource access also have agriculture-focused livelihoods (Figure 5.2.14). They participate in rain fed agriculture, gardening, and animal husbandry at roughly the same rate as those with high livelihoods resource access. However, only 10% of those in this group reported a source of non-farm employment, far less than among the High Livelihoods Resource Group.



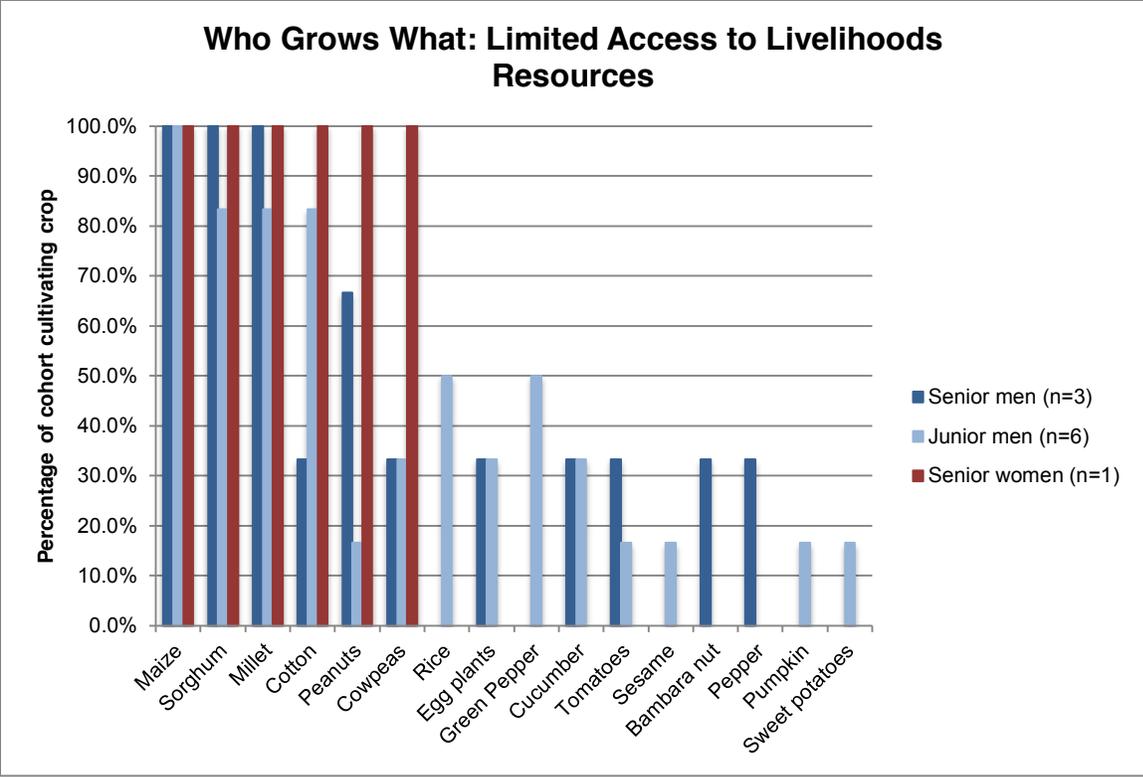
**Figure 5.2.14: The livelihoods activities reported by members of the Limited Livelihoods Resource Access group in 2014.**

In the 2014 sample, only a single senior woman joined an otherwise male-dominated group. As seen in the high livelihoods resource access group above, the men in this group do not display any significant seniority-based differences in livelihoods activities (Figure 5.2.15). In general, for men rain-fed agriculture appears to be a source of food security and income. Men see themselves principally as farmers, however, because farming ensures the food security of the family. The junior men in interview #1, for example, noted that while his work as a traditional healer brought in as much money as farming, he saw agriculture as the basis of his livelihoods because it was the foundation for food security. Gardening is a critical source of income for these men, which is generally used to meet household expenses and reinvested in agricultural production. For example, the junior man in interview #36 noted that gardening was a critical means of raising the money needed to buy agricultural inputs at the start of the rain-fed agricultural season (see also the junior man in interview #38). Only one senior woman fell into this group, a widow with a great deal of control over her own agricultural decision-making. It is therefore difficult to interpret her activities as representative of a gendered difference or as idiosyncratic. However, the 2012 data, while not distinguishing by livelihoods resource access groups, does show that all senior women in that sample participated in both agriculture and small business. They did not list gardening as an activity, but in 2012 two of the five senior women interviewed listed okra as a crop they cultivated. Okra is a garden crop, suggesting that at least these two women participated in gardening. However, this activity did not appear to be as high a priority for women, or as clearly gendered, as seen in other parts of southern Mali. Instead, gardening in Niamanasso, and in Zone ML 10, appears to have been co-opted by men as a means of raising capital that supports rain-fed agricultural production.



**Figure 5.2.15: The livelihoods activities reported by junior and senior men, and the single senior woman, in the Limited Livelihoods Resource Access group in 2014.**

The general similarities among men of different seniorities carries over into the crops they select (Figure 5.2.16). The principal differences in rates of selection are around cotton, which junior men are planting at more than twice the rate of senior men, and peanuts, which senior men are planting at nearly four times the rate of junior men. The single senior woman in this group, as a widow, planted a range of crops to meet a range of needs (see discussion below). The 2012 data on senior women’s farming suggests that this woman is, at least in terms of crop selection, an outlier for Niamaasso and the livelihoods zone. In 2012, 80% of senior women produced rice, 40% produced okra, and 20% produced peanuts and sorghum. The fact that the one woman in this group produces maize and millet, generally grown by men as a staple crop in 2012, suggests that her status as a widow changes her crop selection patterns dramatically and therefore she is not representative of married women in this zone or Niamaasso.



**Figure 5.2.16: The crop selections of senior and junior men, and the single senior woman, in the Limited Livelihoods Resource Access group in 2014.**

In this group, when junior and senior men planted the same crops, they largely agreed on its use (Figure 5.2.17). Men saw staple grains like maize, sorghum, millet, and peanuts as subsistence crops that fed the family but, if yields allowed, could provide a marketable surplus. Cotton was the principal cash crop of these men, though far more junior men grew it than senior men. Garden crops were generally cultivated with sale in mind, usually for meeting household needs or for reinvesting in the production of staple grains that meet the family’s food needs. The single senior woman in this group had a similarly conservative agricultural strategy, generally treating all her crops, except cotton, as sources of food. In the cases of maize and sorghum, this woman had an expectation of a marketable surplus. She used her profits from sorghum to purchase herbicide, thus reinvesting her profits in staple crop production.

## Crop Use: Limited Livelihoods Resources

Maize	Avg	Interpreted value	n=
Senior man	1.00	Eat all	1
Junior man	1.33	Eat all	6
Senior woman	2.00	Eat more than sell	1
Junior woman	n/a		

Rice	Avg	Interpreted value	n=
Senior man			
Junior man	2.00	Eat more than sell	3
Senior woman	n/a		
Junior woman	n/a		

Peanuts	Avg	Interpreted value	n=
Senior man	2.00	Eat more than sell	1
Junior man	1.50	Eat more than sell	2
Senior woman	1.00	Eat all	1
Junior woman	n/a		

Cowpeas	Avg	Interpreted value	n=
Senior man			
Junior man	2.50	Eat and sell equally	2
Senior woman	1.00	Eat all	1
Junior woman	n/a		

Bambara nut	Avg	Interpreted value	n=
Senior man	n/a		
Junior man	1.00	Eat all	1
Senior woman	n/a		
Junior woman	n/a		

Eggplant	Avg	Interpreted value	n=
Senior man	n/a		
Junior man	4.75	Sell all	2
Senior woman	n/a		
Junior woman	n/a		

Pumpkin	Avg	Interpreted value	n=
Senior man	n/a		
Junior man	2.00	Eat more than sell	1
Senior woman	n/a		

Tomato	Avg	Interpreted value	n=
Senior man	n/a		
Junior man	2.00	Eat more than sell	1
Senior woman	n/a		
Junior woman	n/a		

Sorghum	Avg	Interpreted value	n=
Senior man	2.00	Eat more than sell	1
Junior man	1.33	Eat all	6
Senior woman	2.00	Eat more than sell	1
Junior woman	n/a		

Millet	Avg	Interpreted value	n=
Senior man	1.00	Eat all	1
Junior man	1.00	Eat all	4
Senior woman	1.00	Eat all	1
Junior woman	n/a		

Cotton	Avg	Interpreted value	n=
Senior man	5.00	Sell all	1
Junior man	5.00	Sell all	5
Senior woman	5.00	Sell all	1
Junior woman	n/a		

Sesame	Avg	Interpreted value	n=
Senior man			1
Junior man	4.00	Sell more than eat	
Senior woman	n/a		
Junior woman	n/a		

Cucumber	Avg	Interpreted value	n=
Senior man	5.00	Sell all	2
Junior man	5.00	Sell all	1
Senior woman	n/a		
Junior woman	n/a		

Green Pepper	Avg	Interpreted value	n=
Senior man	n/a		
Junior man	5.00	Sell all	3
Senior woman	n/a		

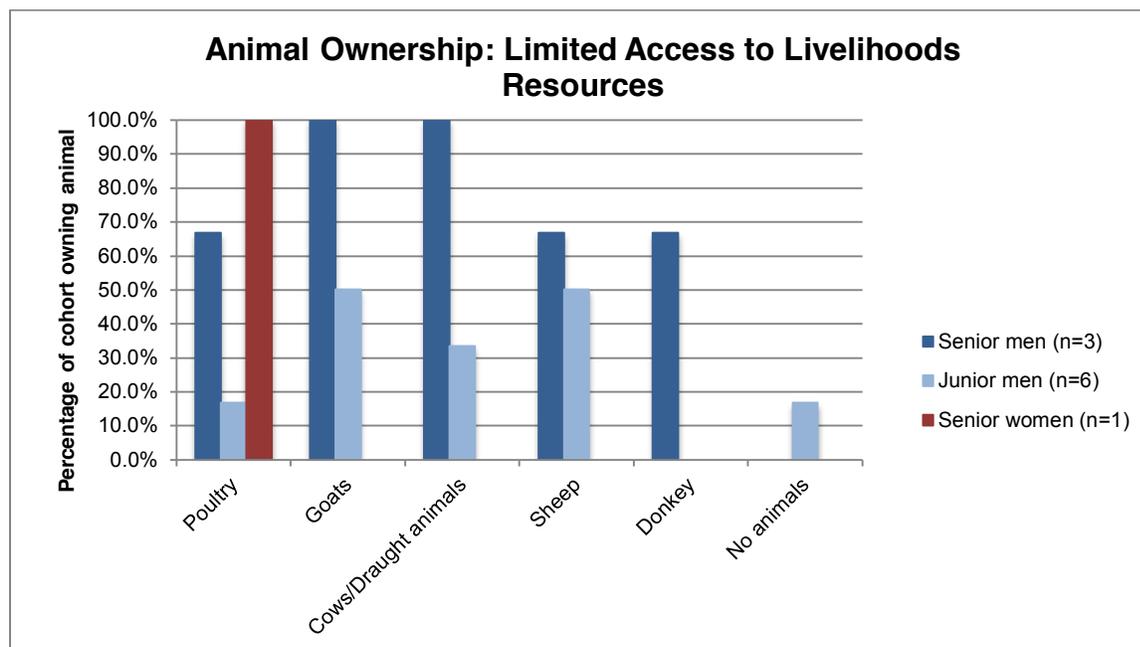
  

Sweet Potato	Avg	Interpreted value	n=
Senior man	n/a		
Junior man	2.00	Eat more than sell	1
Senior woman	n/a		

**Figure 5.2.17: The uses for cultivated crops in the Limited Livelihoods Resource Access Group in 2014, divided by gender/seniority cohorts.**

Among the Limited Access to Livelihoods Resources group, there is a shift in variety selection to shorter cycles relative to the patterns seen in the High Access to Livelihoods Resource group. All senior and junior men cultivated the slightly shorter 120-day sorghum cycles. Senior men generally cultivated 90-day millet cycles, and half cultivated 80-90 maize cycles (while the other half cultivated a 110-day cycle). Their peanut cycle selection fell on a 120-day cycle, which seems to be longer than the cycle favored by the High Access to Livelihoods Resource group. This limited cycle-selection data suggests that the members of this group have less confidence in a long season in which their crops will mature, likely because they are delaying the start of planting as they wait for the use of animals and equipment needed to prepare and cultivate their fields.

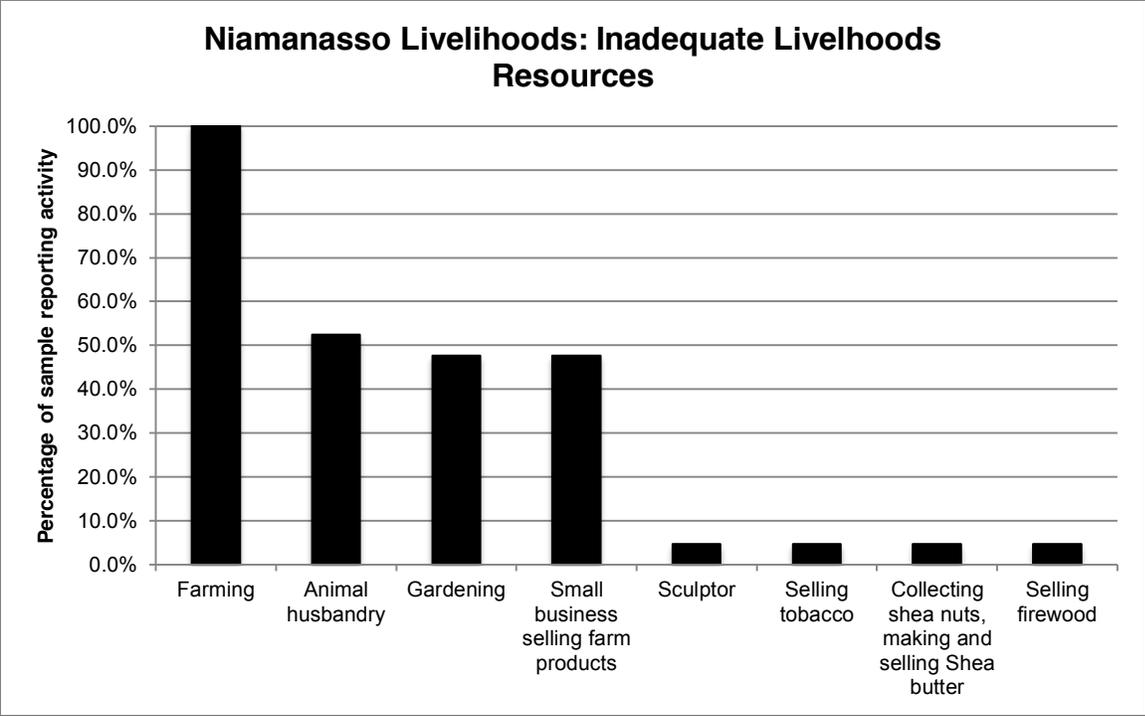
Those with limited access to livelihoods resources own a wide range of animals (Figure 5.2.18). Generally, the uses of these animals follow the pattern seen in the high livelihoods resource group. However, those in the limited livelihoods resource group own them at lower rates than seen in the high livelihoods access group. Within this group, senior men own poultry at four times the rate of junior men, cows and draught cattle at three times the rate, and goats at twice the rate. Senior men also exclusively own donkeys. This differential rate of ownership does not reflect differences in livelihoods activities or strategies between junior and senior men. Despite the differential access to draught animals, there is little difference in their crop or selection cycles, which suggests that both junior and senior men experience significant challenges with regard to accessing agricultural equipment that offsets senior men's greater ownership of draught animals. Instead, the differences in ownership represent different stages in the life course. The junior men in this group have not yet had time to accumulate the resources necessary to purchase these animals. The senior woman only owns chickens, which she sells to buy medicine when she needs it.



**Figure 5.2.18: The rates of animal ownership of senior and junior men, and the single senior woman, in the Limited Livelihoods Resource Access group in 2014.**

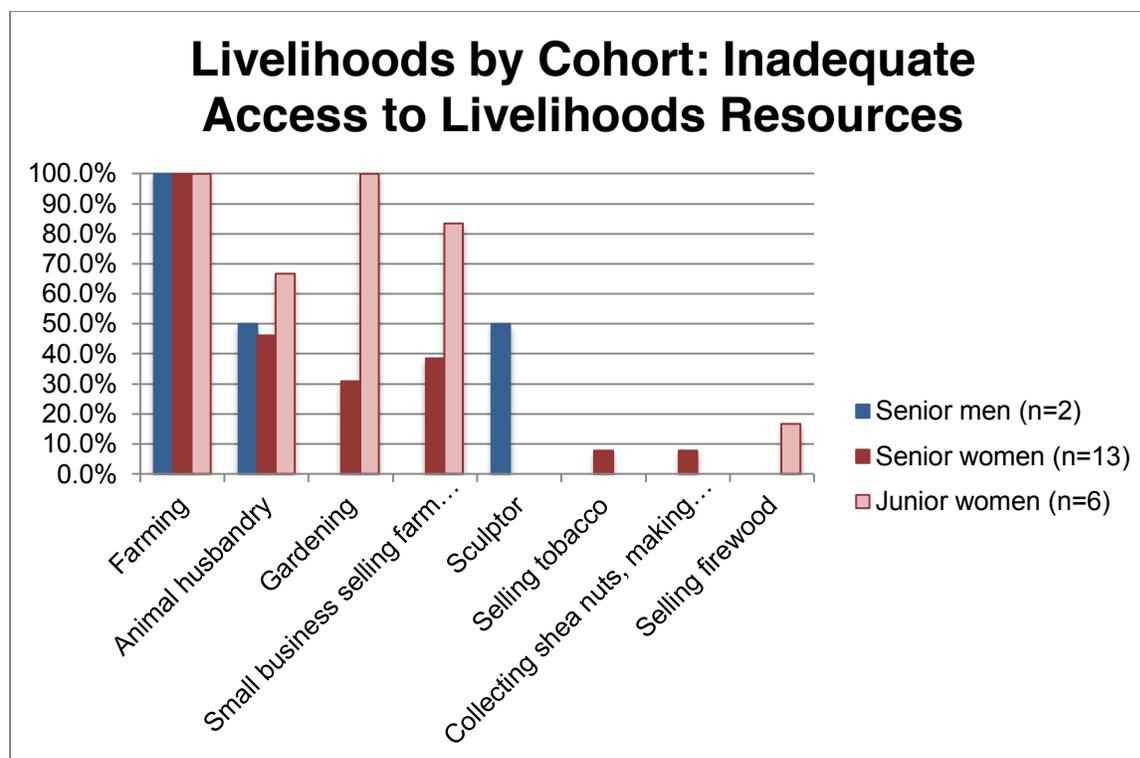
- 5.2.2.3 Those with Inadequate Livelihoods Resource Access

Those residents of Niamanasso with inadequate livelihoods resource access have agriculturally-based livelihoods that superficially resemble those in the other two groups (Figure 5.2.19). All members of this group participate in rain-fed agriculture, and this group is the most engaged in the marketing of farm products. However, overall this group has the lowest rate of participation in animal husbandry, and only 19% of this group reports participation in non-farm activities. Both of these suggest weak access to assets and the cash income needed to build them up.



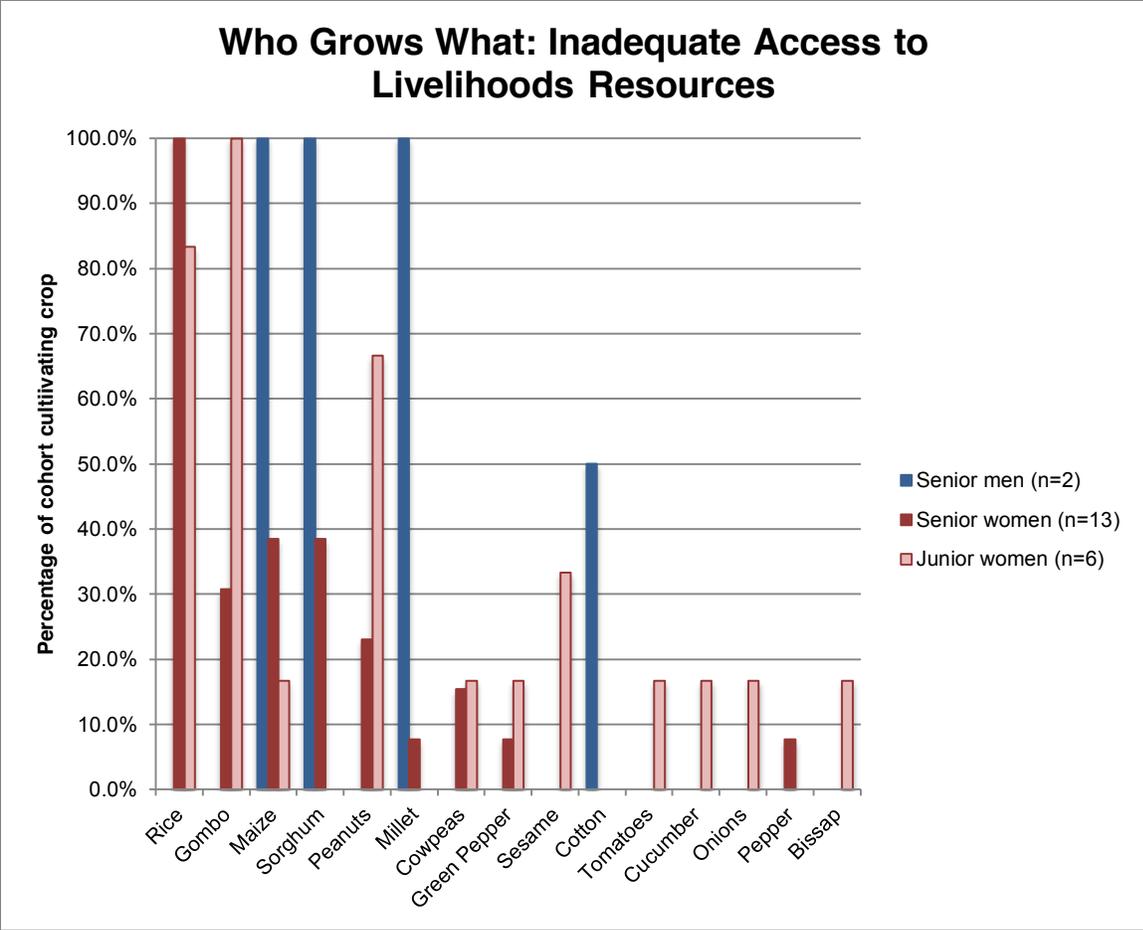
**Figure 5.2.19: The livelihoods activities reported by members of the Inadequate Livelihoods Resource Access group in 2014.**

Within this group, there were no junior men. The group’s two senior men engage in agriculture (Figure 5.2.20). Only one of them raises animals. The other works as a sculptor during the dry season. In this group, women have much higher rates of animal husbandry than these senior men. The livelihoods of women in this group are marked by significant seniority-based differences. Junior women are engaged in gardening and the marketing of farm products at much higher rates than senior women, and are slightly more likely to be raising animals. The small businesses of senior women do not generate a great deal of income. One senior woman (interview #32) said the money she used from selling tobacco, while used



**Figure 5.2.20: The livelihoods activities reported by senior men, senior women, and junior women in the Inadequate Livelihoods Resource Access group in 2014.**

This group exhibits both gender and seniority-based differences in crop selection (Figure 5.2.21). The senior men in this group are cultivating the rain-fed grains maize, sorghum, and millet, and one of them is cultivating cotton. The gendered character of these crops is apparent, as women cultivate these grains at much lower rates than men, with senior women participating in the cultivation of these crops at a much higher rate than junior women. The fact men dominate the cultivation of these grains is not surprising, as men see this cultivation as part of their role as provider for the family. Both senior and junior women participate heavily in rice cultivation, which is clearly gendered to women. They also exclusively cultivate peanuts, which are rain-fed and have an advisory. All other crops cultivated by this group are garden crops, and are exclusively grown by women. Women see gardening as a lucrative activity (junior woman in interview #4) that brings them more money than they can get through rain-fed agriculture. In this group, the lack of gardening by men makes sense. As it appears the principal constraint on gardening is the amount of land a man can cultivate, this resource-challenged group of men cannot access or cultivate enough land to enable a garden.



**Figure 5.2.21: The crop selections of senior men, senior women, and junior women in the Inadequate Livelihoods Resource Access group in 2014.**

In the Inadequate Access to Livelihoods Resources Group, the uses of crops also vary according to the gender and seniority of the farmer (Figure 5.2.22). Cotton is a men’s cash crop, and is not cultivated by women at all. For senior men, rain-fed grains like maize, sorghum, and millet are principally sources of subsistence, but can be sold to fund household or agricultural needs. For example, the senior man in interview #34 said that maize, sorghum, and millet were eaten, but could be sold when he had to buy seeds or address other agricultural issues. Senior women who cultivate these crops (except millet) appear more confident in the production of a surplus, and in the case of sorghum appear to cultivate it for significant sale. One senior woman (interview #13) said that she sold all her sorghum, and saved the money for her daughters when they get married. Another senior woman (interview #17) uses her sorghum to make Dolo, a local wine. She then sells this wine. Junior women do not grow these grains, but junior and senior women both cultivate peanuts, and both appear to expect marketable surpluses of this crop. Women also grow rice as a subsistence staple. One senior woman (interview #13) noted that her children purchased pesticide for her because they eat most of her rice. Garden crops are the provenance of women, and generally appear to be eaten and marketed in similar amounts. This mixed focus, which is somewhat less market oriented than seen among senior women in the limited livelihoods resource group, may be a product of limited access to land or other agricultural resources. For example, one senior woman (interview #22) said she ate all, or nearly all, of her garden crops because she did not produce enough for marketing.

## Crop Use: Inadequate Livelihoods Resources

Maize	Avg	Interpreted value	n=
Senior man	1.50	Eat more than sell	2
Junior man	n/a		
Senior woman	2.00	Eat more than sell	4
Junior woman	n/a		

Sorghum	Avg	Interpreted value	n=
Senior man	1.50	Eat more than sell	2
Junior man	n/a		
Senior woman	3.50	Sell more than eat	6
Junior woman	n/a		

Millet	Avg	Interpreted value	n=
Senior man	1.50	Eat more than sell	2
Junior man	n/a		
Senior woman	1.00	Eat all	1
Junior woman	n/a		

Peanuts	Avg	Interpreted value	n=
Senior man	n/a		
Junior man	n/a		
Senior woman	2.00	Eat more than sell	3
Junior woman	2.50	Eat and sell equally	4

Cotton	Avg	Interpreted value	n=
Senior man	5.00	Sell all	1
Junior man			
Senior woman			
Junior woman	n/a		

Cowpeas	Avg	Interpreted value	n=
Senior man	n/a		
Junior man	n/a		
Senior woman	1.00	Eat all	2
Junior woman	1.00	Eat all	1

Rice	Avg	Interpreted value	n=
Senior man	n/a		
Junior man	n/a		
Senior woman	1.00	Eat all	12
Junior woman	1.30	Eat all	3

Green pepper	Avg	Interpreted value	n=
Senior man	n/a		
Junior man	n/a		
Senior woman	1.00	Eat all	1
Junior woman	4.00	Sell more than eat	1

Pepper	Avg	Interpreted value	n=
Senior man	n/a		
Junior man	n/a		
Senior woman	1.00	Eat all	1
Junior woman	n/a		

Sesame	Avg	Interpreted value	n=
Senior man	n/a		
Junior man	n/a		
Senior woman	n/a		
Junior woman	3.00	Eat and sell equally	1

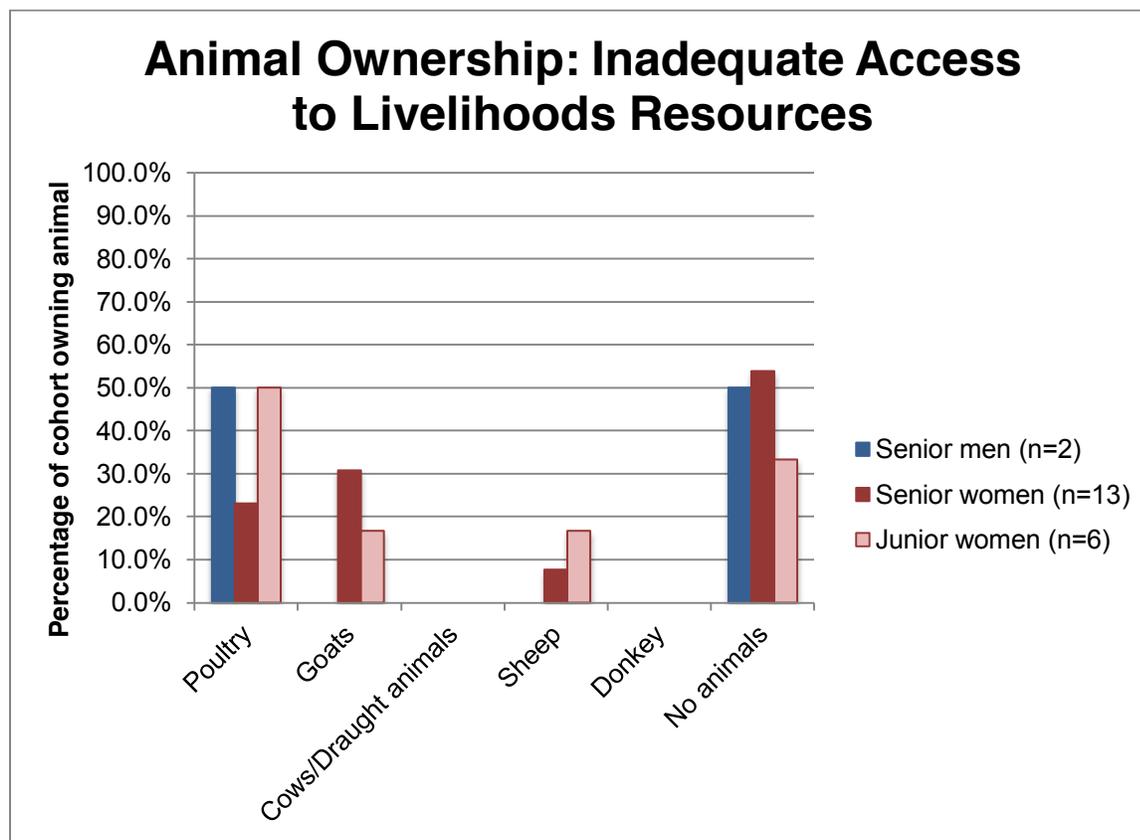
  

Okra	Avg	Interpreted value	n=
Senior man	n/a		
Junior man	n/a		
Senior woman	2.50	Eat and sell equally	4
Junior woman	2.40	Eat more than sell	5

**Figure 5.2.22: The uses for cultivated crops in the Inadequate Livelihoods Resource Access Group in 2014, divided by gender/seniority cohorts.**

The variety selections of the Inadequate Livelihoods Resource Group are very difficult to interpret because relatively little information was gathered about them in the field. This group was growing few of the crops for which there were advisories, and the senior men in the group grew most of these. Because there are only two senior men from which to draw in this group, making the generalizability of their selections difficult to verify.

This group of people has the lowest rates of animal ownership overall, with just under half of the group reporting that they did not own any animals. Nobody in this group owns any draught animals, and they own goats and sheep at very low rates. Therefore, members of this group lack direct access to animal traction, limiting their ability to prepare and cultivate fields. Their limited access to goats, sheep, and fowl further limits their ability to mobilize funds for inputs and equipment at the start of the agricultural season.



**Figure 5.2.23: The rates of animal ownership of senior men, senior women, and junior women in the Inadequate Livelihoods Resource Access group in 2014.**

### 5.2.3. TOOLS OF COERCION IN NIAMANASSO

The discourses of livelihoods in Niamanasso draw upon and mobilize the roles and responsibilities associated with particular identities, producing the appearance of natural responsibilities for livelihoods activities among men and women, both junior and senior, defining what activities make sense in the context of this village, what the goals of such activities should be, and who gets to participate in these activities. For example, senior men, as the principal decision-makers and providers of food and grain for their families, focus their farming on the cultivation of rain-fed staple grains that are the foundation of food security in this village, growing these crops principally for consumption even though they are located in a food-exporting region of the country where the sale of these or other crops might bring in a great deal of money.

Though pervasive, this weaving of livelihoods and identity in Niamanasso is not perfect, nor is it equitable. For example, some benefit less than others under given livelihoods strategies, and often those who benefit less are aware of this relative outcome and are not happy with it. Echoes of discontent can be heard in the words of one senior woman (Interview #13) who explained that her minimum tillage

strategy came about because she does not have farming equipment and she does not want to wait until men are done plowing their farm to come and help. For this woman, waiting delays planting too much, and “rain doesn’t wait for anybody.” Such members of the community have reason to question the order created by discourses of livelihoods and the ways in which they mobilize identity. To address the potential of challenges to this established order, communities are subject to tools of coercion, the means by which order is maintained. These tools speak to the identities, roles, and responsibilities of individuals to create incentives for conforming to expectations.

In Niamanasso, a woman or wife who does not live up to expectations, for example by refusing to work in the house or on her family’s fields, can expect to face a range of sanctions. These start small, such as being criticized by members of the family or the community for their behavior. If this criticism fails, and the problematic behavior or decisions persist, the individual in question will lose the respect and trust of the family and community. As a result, she will be excluded from decision making. One junior man (Interview #8) argued that a woman who failed to live up to her roles and responsibilities would be marginalized by the community, and would not be consulted when important decisions were to be taken by the village. If problematic behavior or decisions still persist, the community will reject the individual entirely. One senior woman (Interview #3) described rejection as a situation where people avoid the problematic woman. A junior woman (interview #5) agreed, saying that a “bad” woman or wife would live in isolation in the village. The escalating character of these sanctions speak to the material conditions of life for a woman in Niamanasso. Women rely on their husbands and families for access to land and livelihoods resources. If they lose the respect of the family and are excluded from decision-making, they lose influence over the use of these key resources. If they are isolated from the family, they cannot access land or agricultural equipment and inputs at all, and lose access to the means of earning a living in the community. It is interesting that nobody in Niamanasso mentioned divorce as a sanction against a bad woman or wife, but it seems likely a woman in this situation would have to leave the village and find a new place to live.

Men are also subject to sanctions if they fail to live up to expectations, and these sanctions vary depending on the seniority of the man. Junior men who do not respect the decisions of senior men, who will not work hard to support their families, or who are seen as otherwise acting in a dishonest manner will be treated like a child (junior man in interview #25). This junior man argued that people would say that a bad junior man has not grown up, and they will not give him any responsibilities. A “bad” junior man will also have difficulty finding a wife, for as the senior man in interview #20 said, nobody will give a bad man his daughter in marriage. In short, a bad junior man will find it impossible to gain the authority and family he needs to be seen as a senior man worthy of respect in the community, effectively trapping such a man in “junior” status. In such a situation, these men would never gain a voice in family or community decisions, and forever be under the authority of more senior men.

Senior men, while having the greatest authority in Niamanasso, are not exempt from expectations, and therefore tools of coercion. Senior men are expected to be wise, to offer useful advice, to work hard, and to provide grain and food for their families. A senior man who fails to live up to these expectations will lose respect in the family and community and, especially if he does not work hard, will find no help in the community (junior woman in Interview #26). This first level of sanction challenges the identity of a senior man as someone who provides food security and other resources for his family, making it very difficult to live up to this responsibility, effectively stripping away this part of his identity. The failure to provide adequate food and support for his family has other implications. Such a senior man, for example, will not be able to take a second wife (senior man in Interview #24, junior man in Interview #25, senior woman in Interview #3, junior women in Interviews #5 and #6). The removal of assistance from the community, and the limitations on second marriages, puts significant pressure on senior men to live up to their responsibilities. If these failures persist, or a senior man proves unable to make good decisions or

provide good advice, he will find himself excluded from village-level decisions, and eventually family-level decisions (senior men in Interviews #15 and #24, junior women in Interviews #5, #6, and #26). This strikes to the very core of the identity of a senior man, as the authority that makes agricultural and other livelihoods decisions for the family. Being excluded from such discussions recasts the man as someone with the same authority as a junior woman, and less authority than a successful senior woman. At this point, a senior man might even be expelled from the family or community in favor of another senior man (senior man in interview #18).

Thus, in Niamanasso the weaving of discourses of livelihoods and particular roles and responsibilities associated with the identities of individuals in the community are reinforced by an escalating set of sanctions for transgression. These push individuals toward conformity with the patterns of livelihoods activity, decision-making, and outcomes described above. This explains the existence and persistence of strong patterns of behavior manifest at the intersection of gender/seniority/access to livelihoods resources in Niamanasso, despite unequal outcomes and discontent at least among some, with these outcomes.

#### **5.2.4. NIAMANASSO: DIFFERENT VULNERABILITIES, DIFFERENT DECISIONS**

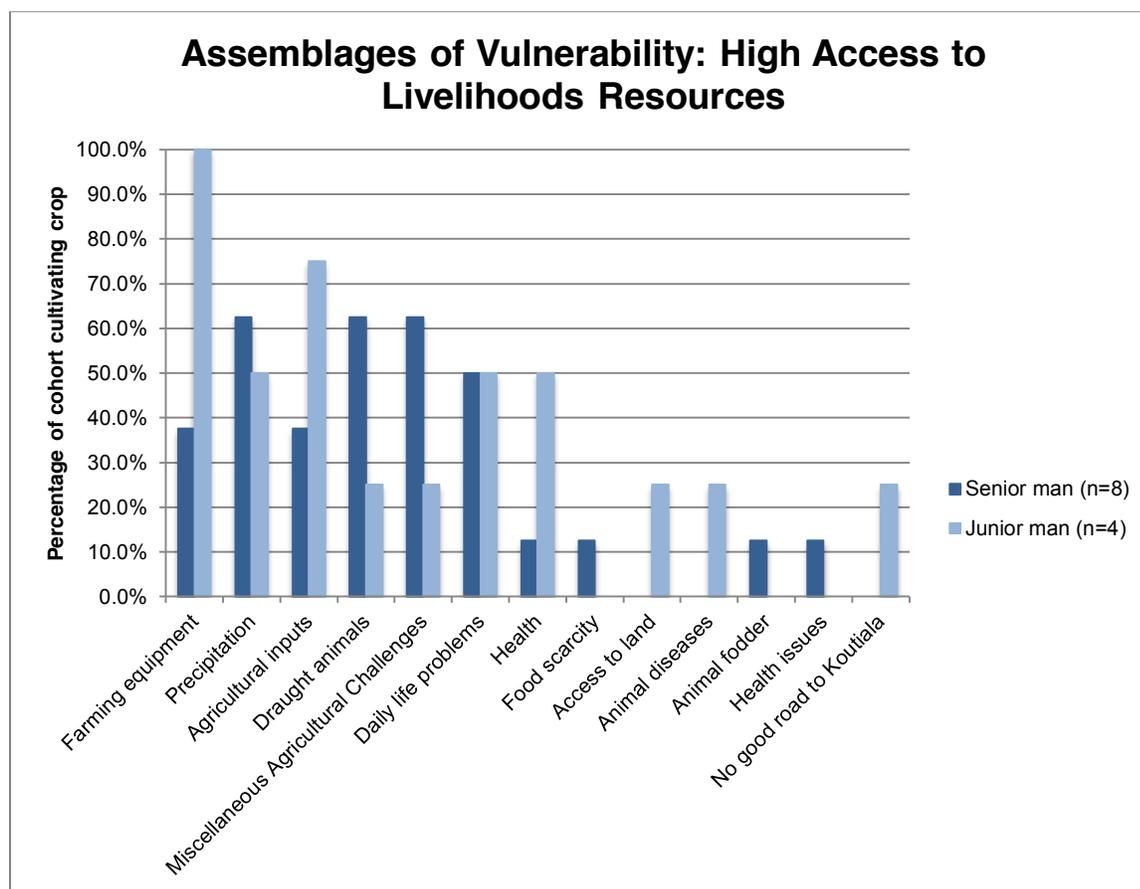
Through the discussion of identity, discourses of livelihoods, and tools of coercion above, we can now rigorously interpret the sources and implications of the different assemblages of vulnerability at play in Niamanasso. This, in turn, allows us to better see the potential utility of climate services to different residents of this village, and the larger livelihoods zone to which it belongs.

While all members of the **High Access to Livelihoods Resources** group are men, they display different assemblages of vulnerability that are shaped by the seniority of the individual in question (Figure 5.2.24). Senior men in this group have relatively few concerns. While access to farming equipment and draught animals appear to be two of the larger stressors these men face, their experience of access issues is rather different than for other groups in the village. These men, when they speak of access problems with regard to draught animals, are concerned with obtaining *more* animals, either to farm larger areas or to farm more efficiently. This is also true of farming equipment. One senior man in this group (interview #16) captured the general experience of these issues when he said that his problem was that he owned 22 hectares of land, and did not have enough farming equipment or draught animals for all his fields. Another of these senior men (Interview #40) expressed a desire to get a tractor, which would help him to save time and increase his productivity. Given this concern for increasing yields and production, it is not surprising these men are also concerned about precipitation and the cost of inputs. With large stressors like access to animals and equipment generally non-issues for these men, they are concerned with other limitations on their production, and precipitation is a key input to that production over which they have little control. Inputs are the other key variable, and their cost shapes the amount of profit these men can earn from their production. Beyond these broad concerns, these men express concerns that become idiosyncratic. Without concern for major stressors that limit production such that food security is compromised, they are free to worry about smaller issues that affect their quality of life.

Junior men are in a similar situation. Their assemblage of vulnerability appears somewhat different from that of senior men in this group, in that they seem to have greater concern for access to equipment and inputs. However, as with senior men, these concerns do not represent an absolute lack of equipment or inputs, just insufficient quantities to meet their ambitions. These men wanted more farming equipment, for as one junior man argued (Interview #42), what he has is not sufficient to farm as much as he wants. Several of these men cast their concerns for access to equipment in terms of a desire to own tractors. They had animal traction, but saw this as insufficient when compared to tractors. The general framing of the concern for inputs was captured by one junior man (Interview #42), who said that he did not have enough money to buy all the fertilizer *he needs*. This is an important construction of this stressor – he has

fertilizer, just not as much as he wants. This is a different challenge than not having any access to fertilizer at all. The one junior man (Interview #37) concerned about access to draught animals was, like senior men in this group, seeking to own more cattle for animal traction to better farm his fields. In short, the assemblage of vulnerability associated with these men represents the concerns of men operating from a position of great stability and security, seeking to overcome the barriers that prevent them from becoming *more* wealthy.

The principal reason for these men to use advisories is to improve their already-strong livelihoods and social status in the community. These men have had success without the advisories, which appears to create a belief in their own indicators that trumps any information provided by the advisories. For example, on junior man (Interview #10) noted that he applied fertilizer to his fields after the rains had started, but he did not use the rain gauge to figure out if there was enough rain for this activity. Instead, he digs into the soil in his fields to evaluate the depth and degree of soil moisture, and uses his personal experience to evaluate the state of his fields from this indicator. It may be that soil moisture is an adequate indicator for planting and the timing of inputs, and these men have little use for the additional information when it comes to planting or the application of inputs. However, indicators like soil moisture do not provide information about the likely length or quality of the season, and therefore it is possible that advisories might help these men better select varieties that will suit the upcoming season.



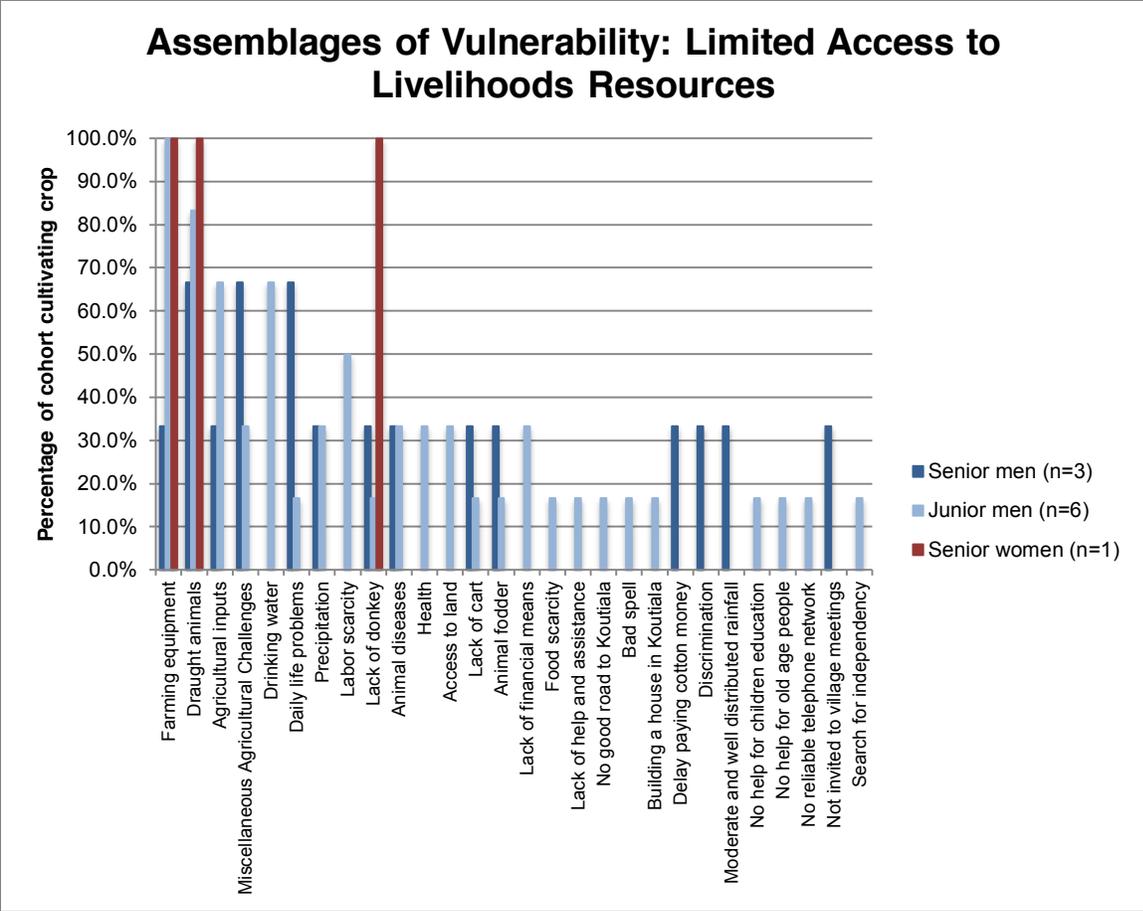
**Figure 5.2.24: Assemblages of vulnerability by seniority for the men in the High Access to Livelihoods Resources group in 2014.**

Nearly all members of the **Limited Access to Livelihoods Resources** group are men, and there are relatively few members of this group overall. However, there are seniority-differentiated concerns among men (Figure 5.2.25). Senior men in this group are most concerned with fairly idiosyncratic concerns in their agricultural practices and their daily lives. The one senior man (Interview #9) concerned with access to equipment suffered from an absolute lack of equipment he needed, explaining that this forced him to delay field preparation and planting until he could borrow farming equipment, sometimes creating a situation where by the time he started planting it was too late to catch up with the season. The two senior men concerned with access to draught animals owned these animals, but only one each, which is not enough to effectively pull a plow. One of these men (Interview #40) partners with another person who also only has one cow to allow them both to plow in more timely manner. However, it is clear that even this strategy results in slower, limited field preparation. These men also lack the assets needed to easily access inputs. One senior man (Interview #20) noted that using inputs on his fields generally required him to sell animals to raise the money, a substantial drawdown of his limited resources. These senior men are significantly less secure than their counterparts in the High Livelihoods Resource Access group, as they face stresses that fundamentally challenge their responsibility to feed and provide for their families.

Junior men in this group appear to have greater concern for basic agricultural needs like equipment, animals, and inputs that are somewhat more accentuated than, but generally the same, as their senior counterparts (Figure 5.2.25). While all of these men owned either goats or sheep, which provide a source of working capital, none owned draught animals, forcing them to wait to rent/borrow an animal to prepare their fields. Their concerns for access to farming equipment reflect a desire to meet the food needs of their families. For example, the junior man in Interview #25 said there were a lot of people in his family, and their farming equipment was not sufficient for all of them. Several of these men expressed concerns for the cost of inputs, and while none directly referenced selling off assets such as animals to purchase needed inputs, it is clear they lack the working capital to purchase inputs without such a sell-off. Unable to mobilize animals and equipment, these men need greater access to labor to cover their agricultural needs. Overall, these men are somewhat less secure than the senior men in this group, and much less secure than their counterparts in the High Access to Livelihoods Resources group. This is reinforced by their relatively low rates of concern for idiosyncratic daily life or agricultural concerns; they are too busy dealing with major concerns for smaller quality-of-life stresses to rise to a level of importance.

Like men in the High Access to Livelihoods Resources group, these men are generally successful at feeding their families. With regard to this goal, they are not as secure as those with more resources, but at the same time they show little concern for the onset of the rainy season as a limiting factor in their production. It is possible that for this group, good length of season data could help them better select crop varieties, but this will only matter if these men start their agricultural activities early enough for advisories to provide meaningful information. If these men start their activities so late in the season that there is nothing to do but plant very short cycle varieties, advisories are of no use.

The single senior woman's assemblage of vulnerabilities is difficult to generalize, though it does make sense in the context of her identity and her livelihoods. As a widow, she does not have a husband to support her with rain-fed grains, and therefore she must cultivate them herself. Therefore, she will be more concerned with gaining access to equipment and animal traction than most other women, junior or senior. The fact she has a small business selling farm goods explains her concern over access to a donkey, as such animals are generally used to transport goods and inputs to and from the fields.



**Figure 5.2.25: Assemblages of vulnerability by seniority and gender in the Limited Access to Livelihoods Resources group in 2014.**

Women dominate the **Inadequate Access to Livelihoods Resource** group, with only two senior men included. These men lack animals and equipment, and therefore see these as critical needs in meeting the food and income needs of their families. One of the men (interview #34) was also concerned about the lack of a cart and donkey, though it is not clear how this would play into his livelihoods as he cannot afford inputs, nor does he appear to be participating in activities that require the movement of goods to market, unless he has to sell some of his staple crops to address a family need.

The low rates of advisory use for these men are the product of their limited livelihoods resources. However, because their agricultural activities are often delayed, information on the length of the season could prove very useful for ensuring that their harvests are large enough to meet family needs, and therefore reinforce their social status. For these men, who will face large constraints in the amount of crop they can cultivate, a focus on maize, sorghum, and millet advisories will likely meet most of their information needs. Other crops are lower priority for these men, and therefore planted later (if at all) when the season demands short-cycle varieties.

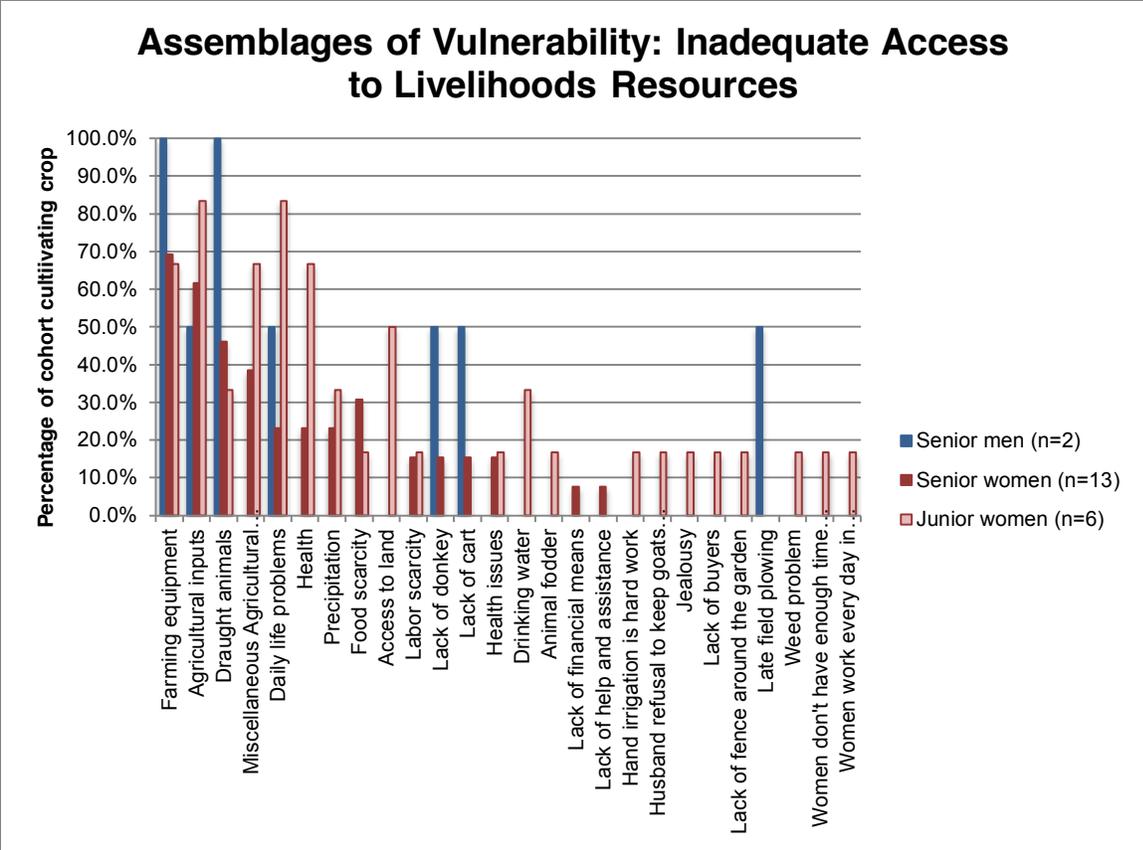
Among women in this group, there are seniority-based differences in the challenges they face. Senior women are most concerned with access to farming equipment and inputs, and to a slightly lesser extent access to draught animals. Only one of these women (interview #32) had access to draught animals and equipment, but she claimed that the two cattle and single plow were not enough to plow all of the family’s fields. Most other senior women lacked access to either equipment or animals, and most did not

have access to the resources they needed to purchase inputs. After these large challenges, their assemblages of vulnerability largely devolve into idiosyncratic farming and daily life challenges.

Senior women in this group have little incentive to use the advisories. While these women do not have independent agricultural decision-making authority, this only partially explains why they are not using advisories. Some of these women are widows who do not answer to a husband or head of the household, and therefore can make their own decisions. However, even these women are not using the advisories either. Instead, it appears the principal challenge for these women is the timing of their activities. While they farm peanuts (a crop for which there is an advisory), their field preparation and planting is delayed by requirements for labor on men's fields. This pushes their preparation and cultivation of peanut fields late into the season. Further, senior women seem to be more focused on cultivating garden crops for income, with peanut cultivation something of an afterthought. The provision of a rice advisory could be somewhat useful for these women, assuming they are able to prepare fields in a more timely manner than seen with peanuts.

Junior women in this group have a very different assemblage of vulnerability. These women are most concerned about access to inputs, and idiosyncratic agricultural and everyday life challenges. Beyond these significant stressors, junior women are also concerned with access to land. In general, it appears that many of these women lack their own livelihoods resources, but are part of families that do own animals and equipment to which they can gain access, if not in a timely manner. Inputs are a challenge because these women own few small animals that might be sold to purchase these materials. While nearly all women grow rice in this group, and cultivate an average of 1.83 garden crops each, these women are land constrained. One junior woman (Interview #29) has to farm her rice and okra with a field she shares with her sister-in-law. Another (Interview #5) was given a plot of land for rice by her husband, but had to wait until he decided what land to give her before she could begin to work on it. In 2014, she was still waiting at the time of the mid-June interview, when much of the season had already passed. Another (interview #6) appeared to operate under the same constraints, noting that she did not think she would get land for rice in 2014.

Junior women in this group lack *timely* access to the livelihoods resources they need to use at least peanut advisories. However, their delayed access to animals and equipment is a product of their relatively low social status in Niamanasso and the wider zone, and the low priority their production receives from others in their families. These women work as many as six days a week in their husbands' farms, and therefore have little time for the own cultivation. What cultivation they can engage in appears to be focused on garden crops, which likely further reduces their interest in advisories. Finally, these women generally lack the ability to make their own agricultural decisions, instead following the instructions of men and senior women. Unless those higher in the decision-making structure either use advisories themselves, or approve of junior women using the advisories to make their own decisions, these women will have few chances to employ advisory recommendations into their agricultural decisions.



**Figure 5.2.26: Assemblages of vulnerability by seniority and gender in the Limited Access to Livelihoods Resources group in 2014.**

**5.2.5. NIAMANASSO: EXPLAINING EXISTING ADVISORY USE**

While rates of advisory use in Niamanasso are higher than in any other part of southern Mali studied in this assessment, they are still relatively low overall (23.3%) and sensitive to both gender and seniority. While almost 39% of senior men and 30% of junior men were using the advisories, only 14.3% of senior women and no junior women were using them. In the preliminary assessment of advisory use (Carr, 2014a) the gendered character of advisory use suggested the women were not using the advisories because they were growing few crops for which there is an advisory.

With the analysis above, however, we can now re-approach this advisory use data from the perspective of the different vulnerability groups outlined above (Figure 5.2.27). In Niamanasso, nearly half of those with high access to livelihoods resources are using the advisories. Almost a third of those with limited access to livelihoods resources are using the advisories, even though they may lack equipment or animals that would allow them to respond to the advisories in a timely manner. It is only those with inadequate access to livelihoods resources that are greatly limited in their engagement with the advisories. Those in this group are only using the advisories because other people are telling them about the suggestions that are delivered. The members of this group, both men and women, are cultivating advisory crops, and therefore this rate of use cannot be explained away as a group dominated by women who do not grow crops for which there are advisories. Instead the declining rate of use of the advisories across the three groups demonstrates the importance of access to agricultural resources like draught animals and agricultural equipment to the utilization of the advisories. Those without these resources cannot respond to the directions of the advisories, and generally must wait to borrow animals and equipment until the

remaining season is very short and there are few variety-specific selections to be made. As individuals have less access to these critical livelihoods resources, they have less ability to respond to/use the advisories, thus explaining the declining rate of use across these groups.

This interpretation is furthered by a deeper dive into advisory use in Niamanasso. Within the High Access to Livelihoods Resources group, half of junior men and 37.5% of senior men were using the advisories. In the Limited Access to Livelihoods Resources group, nearly 67% of senior men were using the advisories, as opposed to less than 17% of junior men and no women (the one senior women in this group was not using advisories). In this group, all senior men had draught animals, while only a third of junior men had this livelihoods resource. Further, only a third of senior men were concerned with access to adequate agricultural equipment, while all junior men faced challenges accessing adequate agricultural equipment. In short the use of advisories in this group is highly correlated to individual access to the livelihoods resources needed to respond to them in a timely manner. Finally, a look inside the advisory use rate of the Inadequate Access to Livelihoods Resource group demonstrates that any explanation of advisory use by gender alone is inadequate. The only two people in this group using the advisories are both senior women. Both women are married, and therefore their husbands are not preventing them from using the advisories. Instead, one of these women (Interview #7) heard about the advisories from a neighbor, while the other (Interview #17) was told of the information in the advisories by her children.

	<b>Advisory info from someone else</b>	<b>Read rain gauge before undertaking farming activities</b>	<b>Overall percentage using advisories</b>
<b>High Access to Livelihoods Resources</b>	16.7%	25.0%	41.7%
<b>Limited Access to Livelihoods Resources</b>	10.0%	20.0%	30.0%
<b>Inadequate Access to Livelihoods Resources</b>	9.5%	0.0%	9.5%

**Figure 5.2.27: Rates of advisory use by the different vulnerability groups in Niamanasso.**

This data demonstrates that the use of advisories is a deeply social challenge. While access to livelihoods resources is clearly the largest factor shaping the rates of use of advisories in zone ML 10, that access is itself a product of gender- and seniority-related roles and responsibilities. Further, the influence of access to livelihoods resources on the use of advisories is tempered by the weaving of livelihoods and identity in this zone, a weaving reinforced by tools of coercion that create significant negative incentives for transgression.

### 5.3. BATIMAKANA/ZONE ML 11

Batimakana is a village located roughly 24 kilometers northwest of Kita, capital of the Kita Cercle in the Kayes Region (Figure 5.3.1). The village is located in the Djidian commune of the Kita Cercle. Though located in the far western portion of Cluster 3, livelihoods zone ML11 “South maize, cotton, and fruits”, the preliminary report found Batimakana to be highly representative of this zone as a whole. According to the 2009 census, Batimakana was home to 1380 people (668 men and 712 women). The community is divided into 69 concessions, each averaging 3.03 households. The villages’ 209 households average 6.6 people each.



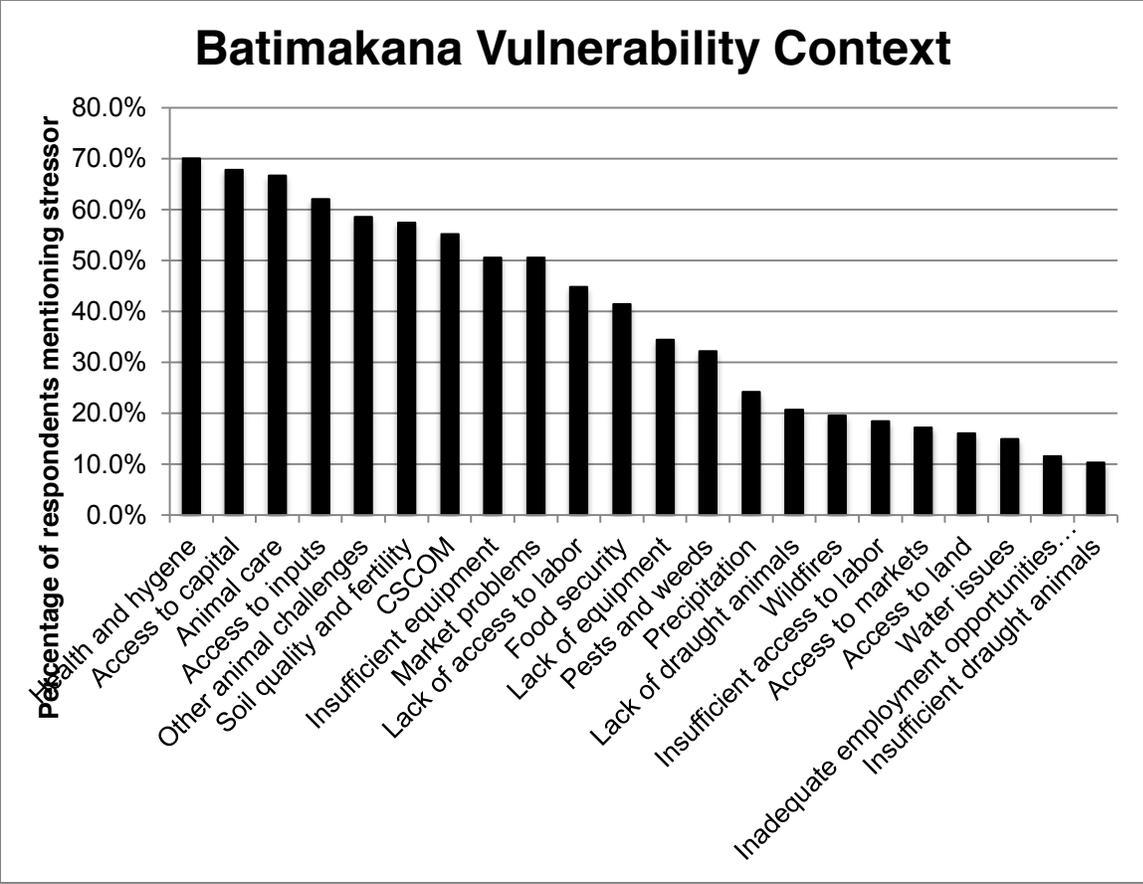
**Figure 5.3.1: Locator map of Batimakana, and Zone ML 11. This map represents the assessments interpretation of the boundaries of this zone, and also includes the area where Zone ML 11 unevenly shades into Zone ML 10. Map credit: Christopher J. Witt, Department of Geography, University of South Carolina.**

In general, zone ML 11 receives between 1000-1300 mm of rain annually. Rain falls principally from May through October, with the heaviest amounts arriving from July through September (Dixon & Holt, 2010, p. 101). Those living in this zone experience a hungry season that runs from late June through August. Poorer households will experience food shortages through this time, while wealthier households will have a much shorter period of food shortage, if they experience shortages at all. Wealthier households can sell dairy products from their cattle to address any shortages, while members of poorer households find themselves laboring on the farms of the wealthy or gathering shea nuts to raise funds with which to buy food. Other challenges captured by Dixon and Holt (2010, p.107) include variable and unpredictable precipitation, access to agricultural inputs, pests (for their impacts on agriculture), animal illnesses, inadequate pasturage and water for livestock, and access to appropriate seeds. Figure 5.3.2 represents a qualitative ranking, from most to least important, of the stressors mentioned by respondents in the villages of Zone ML11 with access to the advisories, and specifically in Batimakana, in the preliminary assessment of the Agrometeorological Program.



**Figure 5.3.2: Vulnerability contexts of Zone ML11 and Batimakana specifically, from the 2012 preliminary assessment.**

Figure 5.3.3 illustrates the results of a more detailed analysis of the vulnerability context of Batimakana, gathered through 89 semi-structured interviews in June and July of 2014. This data represents an assemblage of vulnerability broadly similar to that seen in both Zone ML 11 as a whole, and in Batimakana specifically, in 2012. Lack of access to adequate farming equipment is an important stressor in these datasets, as are concerns for animal care and upkeep, food security, soil quality and fertility, and market-related challenges. Health and hygiene were much more important issues in the 2014 dataset than in 2012, and precipitation issues are somewhat less important in 2014 than in the 2012 dataset. The latter difference might be explained by the varying quality of seasons in this zone, which can reshape perceptions of precipitation as a challenge on a seasonal basis. On the whole, however, the situation in Batimakana in 2014 is broadly consonant with the vulnerability context of Zone ML 11 broadly, and that seen in Batimakana in 2012.



**Figure 5.3.3: The vulnerability context of Batimakana, from the 2014 field data.**

The preliminary assessment of advisory use (Carr, 2014a) found that in Zone ML 11, very few of those with access to the advisories were even aware of the advisory program (Figure 5.3.4). Roughly two-thirds of both senior and junior men who were aware of the program claimed they were using it, using a functional understanding of the program as a proxy for use suggest that less than 10% of senior men and less than 20% of junior men were using the advisories. One third of senior and junior women claimed to be using the advisories. Evidence suggests that less than 20% of senior women, and less than 10% of junior women, had the working knowledge necessary to use the advisories.

## Zone ML 11: "South maize, cotton, and fruits"

	Aware of program	Follow advice	% likely using
GLAM senior men	66.67%	46.67%	9.52%
GLAM senior women	53.33%	33.33%	17.78%
GLAM junior men	93.33%	60.00%	17.28%
GLAM junior women	73.33%	33.33%	9.78%

**Figure 5.3.4: Reported rates of advisory use in Zone ML11 from the 2012 assessment.**

In the 2012 sample from Batimakana, all senior men claimed to use the advisory program, but evidence suggested that only 40% were in fact using the advisories (Figure 5.3.5). Twenty percent of senior women claimed to be using the advisories, and it appeared all of these women were using them. Twenty percent of junior men, and no junior women, claimed to be using the advisories – and evidence suggests that no junior member of the sample was actually using the advisories.

	Individuals	Claims to use	Are using
<b>Senior men</b>	5	100.0%	40.0%
<b>Senior women</b>	5	20.0%	20.0%
<b>Junior men</b>	5	20.0%	0.0%
<b>Junior women</b>	5	0.0%	0.0%

**Figure 5.3.5: 2012 reported and likely use of advisories in Batimakana.**

The 2014 dataset suggests that a large number of men use some form of forecast data to at least partially inform their agricultural decisions (Figure 5.3.6). However, evidence suggests that less than 18% of senior men and 11% of junior men were actually using the agromet advisories as they were designed. Far fewer women used forecast data, and no women appear to be using the advisories. Rates of use in Batimakana, then, are perhaps even lower than seen in zone ML 11 as a whole.

	Individuals	Using forecasts	Using advisories
Senior men	34	67.6%	17.6%
Senior women	22	18.2%	0.0%
Junior men	9	88.9%	11.1%
Junior women	23	13.0%	0.0%

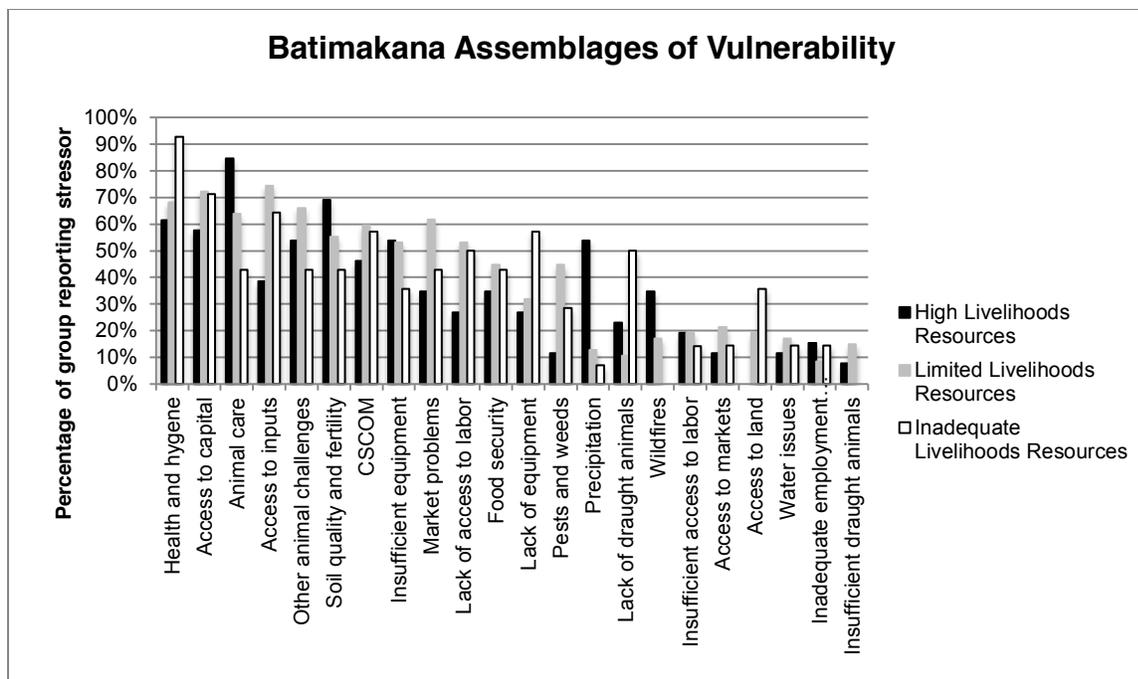
**Figure 5.3.6: 2014 reported use of forecast data generally, as well as advisories specifically, in Batimakana.**

Just as the use of the advisories was not uniform in this village, so to the experience of vulnerability in Batimakana is variable. While the 2012 dataset was a priori stratified by gender and seniority to capture intra-population differences in the use of advisories, in 2014 the team used the more nuanced LIG approach to first stratify the population by assemblages of vulnerability. Through this approach, the field team identified three sub-village groups with different assemblages of vulnerability (Figure 5.3.7).

The first group, the **High Livelihoods Resource Group**, was comprised of residents with all of the farming equipment and animals they need to conduct their agricultural activities in a timely manner. Members of this group have access to enough communal and household labor, or can afford to pay labor, to facilitate planting right at the start of the rainy season. They can also afford to pay for inputs. Often, members of this group have other livelihoods activities beyond farming that provide extra income and capital for agricultural investment. Some members of this group receive remittances, which further solidifies their situation. Many of these residents use advisories, integrating them into their farming activities.

**The Limited Livelihoods Resource Group** is comprised of farmers who have some farming equipment and animals, but not enough to allow for rapid planting. They also lack access to adequate labor, further slowing their agricultural activities. This group is particularly vulnerable to the early cessation of the rainy season, as their agricultural activities can often take much longer than those in The High Livelihoods Resource group.

**The Inadequate Livelihoods Resources Group** is comprised of residents who do not own any equipment or draught animals. As a result, the members of this group must wait to start their agricultural activities until members of the High Livelihoods Resource group or the Limited Livelihoods Resource Group have finished and will lend or rent them animals and equipment. Members of this group appear to have difficulty accessing land for farming, and do not have sustainable incomes from non-farm livelihoods activities.



**Figure 5.3.7: Assemblages of vulnerability for the three groups in Batimakana described above.**

### 5.3.1. IDENTITY IN BATIMAKANA

In Batimakana, these groups speak to the different experiences of vulnerability in the community. However, within these groups are individuals with different identities, roles, and responsibilities. As in the other communities and livelihoods zones in this study, gender and seniority are the principal determinants of decision-making capacity in Batimakana, and therefore the identities, roles, and responsibilities that emerge at the intersection of gender and seniority shape if and how individuals use advisories.

In Batimakana, senior men are the principal decision-makers in the community who, as argued by the senior woman in Interview #46, are expected to properly control the people and resources under their authority. Nearly all residents interviewed who lived in a household or family with senior men deferred to them for decisions including agricultural strategy, livestock decisions, and the allocation and use of household resources. Because of their authority at all levels of social organization, a senior man’s advice and direction to others in the community and household that impacts many people’s food and livelihoods outcomes. While this responsibility includes obvious activities, such as teaching the young (this responsibility was cited in 12% of all responses regarding senior men’s responsibilities), the junior woman in interview #64 captured the wider responsibility of senior men when, while noting that they provide advice, also added that good senior men properly take care of people and resources under their authority. This suggests that giving advice is part of this larger role of caring for the family in the concession and household. In these decisions, senior men were expected to be fair and just, but to be harsh with those who did not listen to them or play their role in the household or concession. As one junior woman (Interview #45) noted, a good senior man does not compromise on rules or customs (see also the senior man in Interview #5). This harshness, however, had to be carefully targeted, as a senior man is expected to listen to the members of his household and concession, and to be understanding of their needs and take pity on those who may not have lived up to expectations. For example, one junior man (Interview #13) noted that when making decisions a good senior man seeks unanimity in an effort

to promote unity in the household, but is firm when needed (noted also by the junior man in interview #31 and the junior woman in Interview #79). In this regard, senior men were expected to bring members of the concession and household together to work toward shared goals and needs, and arbitrate disputes that arise among those under their leadership in a just manner that, according to the senior man in Interview #25, holds everyone to the same standard (see also the junior man in Interview #53, the senior man in Interview #57).

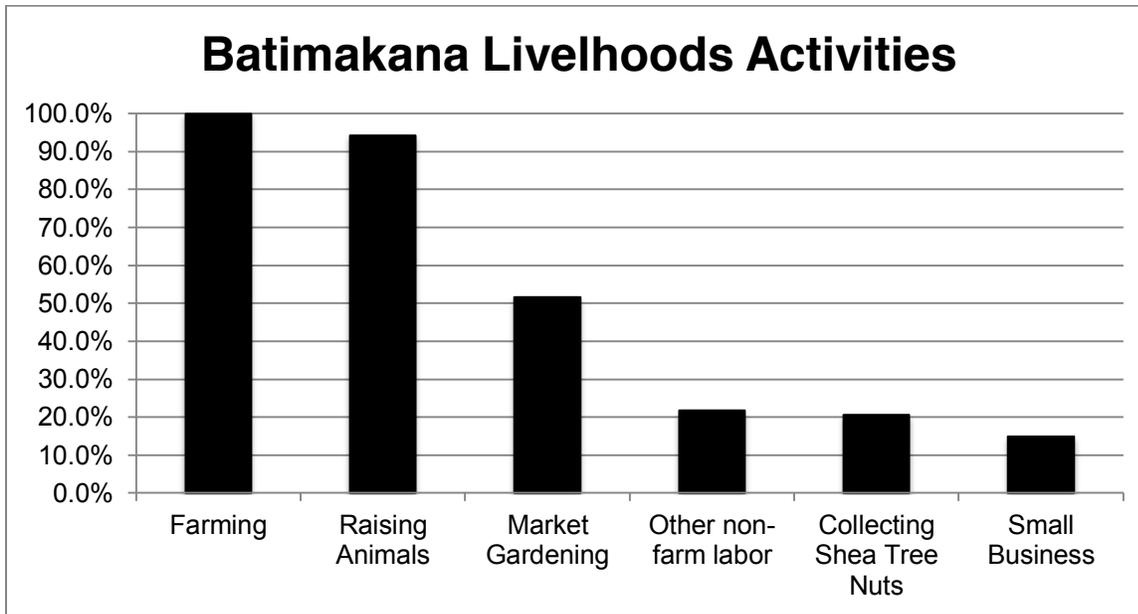
A good junior man has a different set of roles and responsibilities, most clearly marked by a very constrained role as a leader. While he is responsible for much of the agricultural and livelihoods decision-making of his household, a junior man is expected to respect the advice and decisions of senior men in his family and the wider community. In general, junior men do not make many agricultural or animal husbandry-related decisions without consultation with senior men. Nearly every junior man interviewed, when asked about agricultural, livelihoods, or household resource decision-making, deferred to a senior man in his family. Even one junior man (Interview #88) who claimed to make his own farming decisions then offered a caveat by admitting he makes these decisions with advice from his brothers and his father with regard to farming. Overall, a key characteristic of a good junior man is one who follows the instructions and advice of more senior men. Junior men are also expected to be hard working, as it is through this labor that they will help senior men meet the needs of the concession, and provide the members of their own households with needed food and income. One junior woman (Interview #79) noted that a junior man should be respectful, and help his father as much as possible. As junior men do not make many decisions without the council of senior men, there was no mention of “justice” or “fairness” as characteristics of a good junior man (though this was an integral part of being a good senior man). Junior men are expected to be ambitious, to seek to improve themselves and the situation of their household and concession through their labor. The senior man in interview #24 captured all of these characteristics, saying that junior men respected his seniors, worked hard and well, and planned for and worked toward a successful future.

A good senior woman maintains the household’s day-to-day affairs. She does this in two ways: through her labor, and through her leadership. Commonly-cited responsibilities of senior women include overseeing care for grandchildren and young people in general, helping her daughters-in-law organize and complete their domestic tasks, and doing some housework herself. A senior woman’s role comes in the form of her leadership, her ability to build and maintain household and concession-level cohesion. A good senior woman gives advice to her daughters, daughters-in-law, and granddaughters on what one senior man (Interview #65) called the good management of the household. This man argued that a senior woman should order the domestic activities of the household among her daughter-in-laws. No interviewee mentioned senior women advising men of anything, suggesting that senior women’s leadership is confined to their gender, and to the domestic sphere. Other expectations of senior women included courage in the face of challenges, staying at home, keeping peace between her sons and between her daughters, loving her in-laws and her children equally, maintaining respect in the home, and generally acting in a fair and just manner in her dealings with the family.

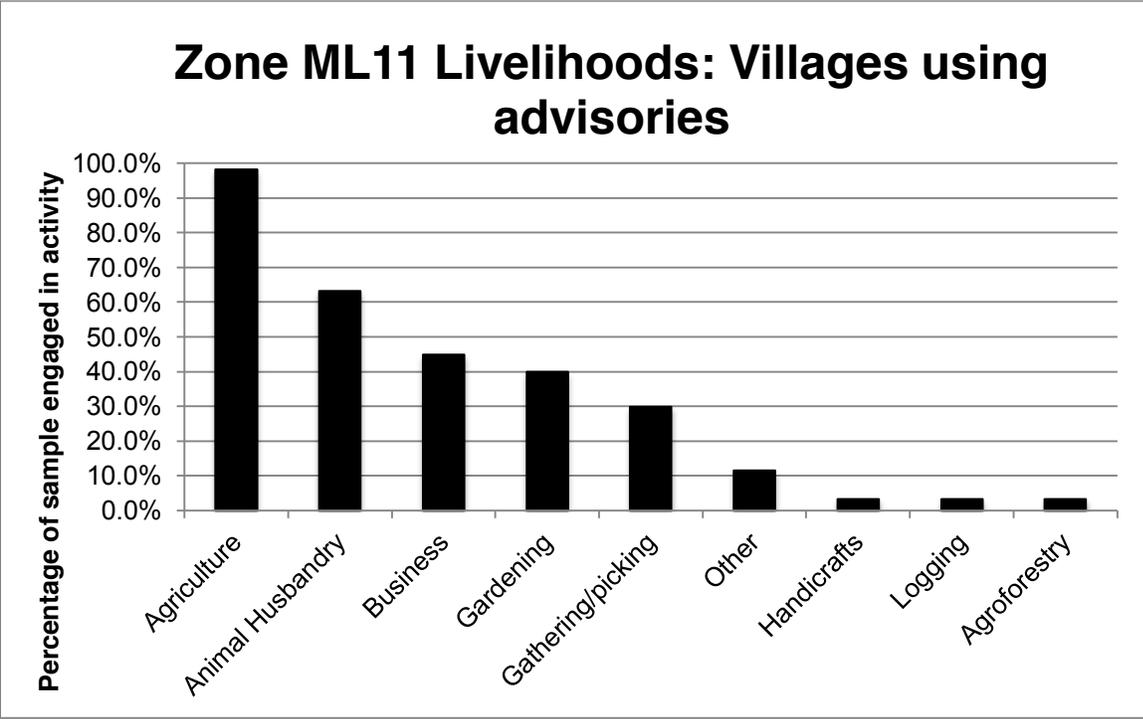
A good junior woman principally works to meet the domestic needs of her household and concession. She is expected to be respectful of the men and senior women with whom she lives, listen to their advice, and to obey that advice and instruction. One senior man (Interview #58) captured this when he noted that a junior woman should listen to the advice of senior people and respect everyone, implying that junior women are at the bottom of social rank in this community. However, as suggested by the literature (see discussion in Section 4.1 of this report), junior women in monogamous households may have a great deal of input into agricultural and other livelihoods decisions.

### 5.3.2. LIVELIHOODS IN BATIMAKANA

Residents of Batimakana are engaged in a limited number of livelihoods activities (Figure 5.3.8). There is a wide range of activities captured under the heading “other non-farm labor”, but these are rare and jobs are generally unique to an individual. Every resident of the village interviewed was engaged in agriculture, and nearly all were raising animals of some sort or another. Of note is the fact that 20% of the residents in this sample reported gathering shea nuts as a livelihoods activity. In this livelihoods zone, shea collection is generally associated with poor, resource-challenged households who use this activity as a means of earning income to get through the hungry season. The pattern of overall livelihood activities in Batimakana is broadly consistent with those gathered in Cluster 3 in 2012 (Figure 5.3.9)



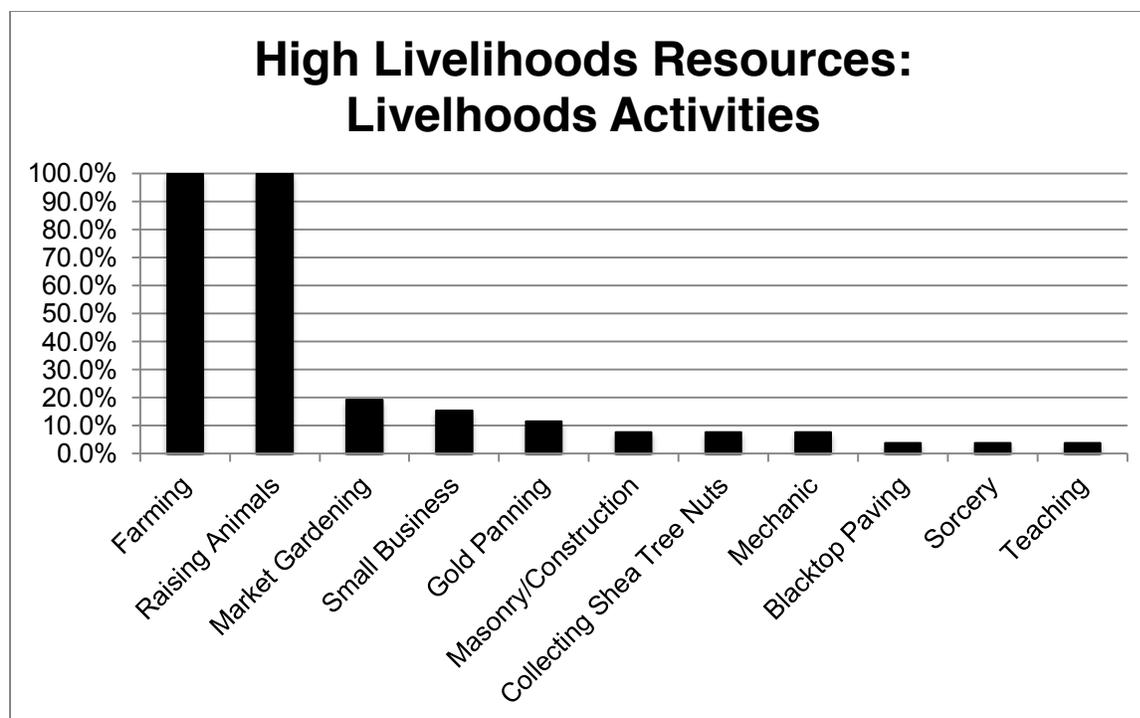
**Figure 5.3.8: The livelihoods activities reported by residents of Batimakana in 2014.**



**Figure 5.3.9: The livelihoods activities reported by residents of Zone ML11 in 2012.**

- 5.3.2.1 The High Livelihoods Resource Group

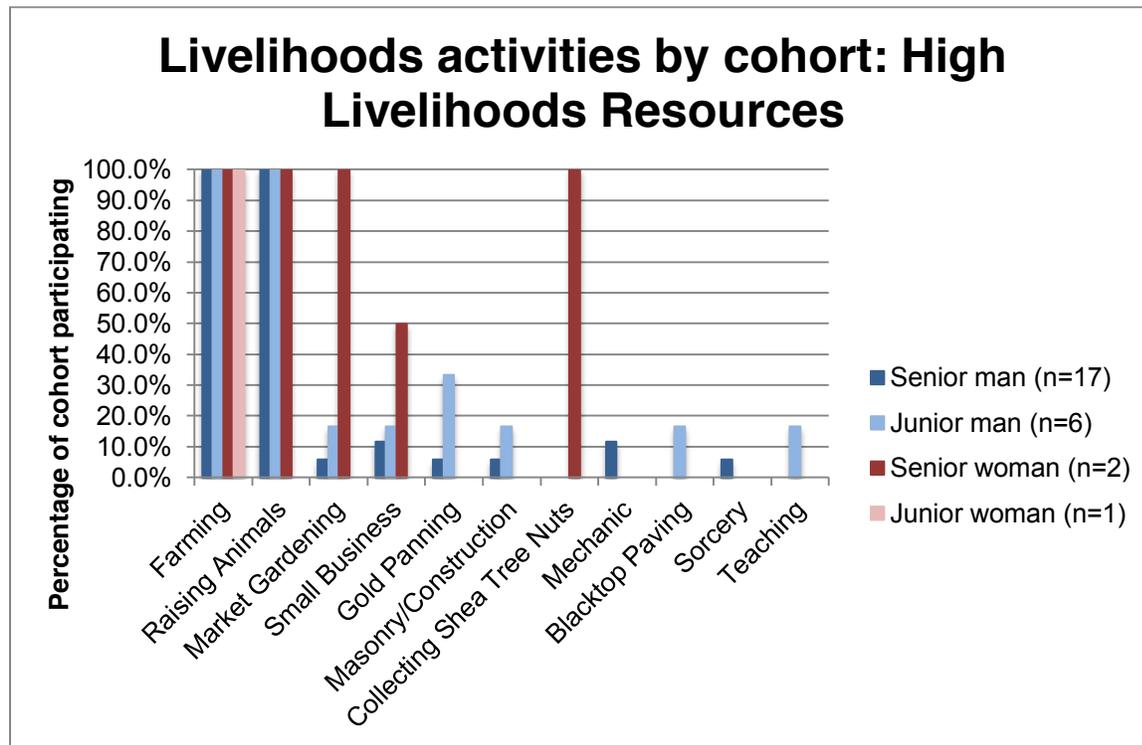
Those in the High Livelihoods Resource group are extremely focused on agriculture and animal husbandry (Figure 5.3.10). 46.2% of this group had some form of non-farm employment, while shea cultivation as reported by only 8% of group members. While this suggests that individuals in the High Livelihoods Resource group are generally food secure, this low rate of participation is more accurately interpreted as a product of the fact that 23 of the 26 (88.5%) members of this group are men who generally would not participate in this activity, even in a food insecure household. Both senior women in this group reported gathering shea nuts. These nuts provide butter for consumption, as well as money that women can use to supplement household needs (senior women in Interviews #16 and #46).



**Figure 5.3.10: Reported livelihoods activities of those with high livelihoods resource access**

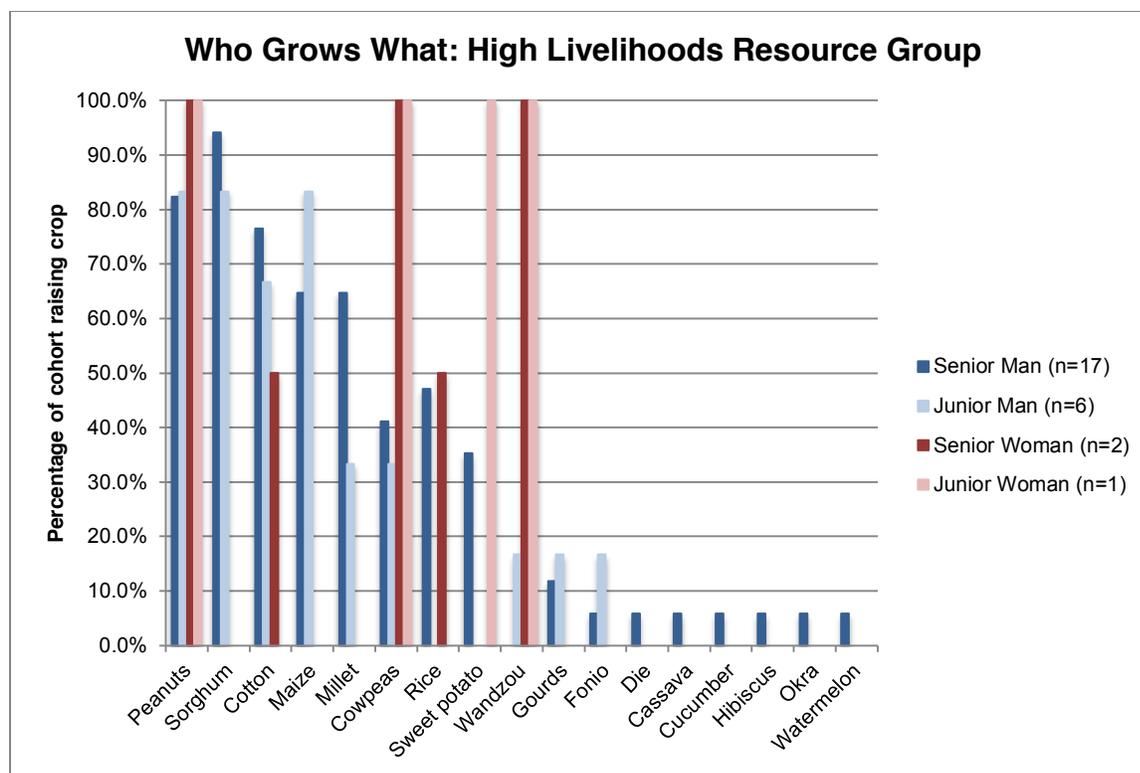
The gendered character of shea collection suggests the need to examine sub-Group differences in rates of participation in livelihoods activities (Figure 5.3.11). There are a very small number of women in this group, and therefore it is difficult to generalize about their activities. However, it is worth noting that very few men participate in market gardening, while both senior women participate. This is in small part because market gardening is seen by some in this village as a woman's activity. For example, one senior man noted that while he felt there were no significant sanctions aimed at men who participated in market gardening, many people in Batimakana did not want him to participate in this activity because it is women's work (Interview #20). However, most men cast the decision not to garden in a different light, such as the junior man in interview #72 who argued that men avoided market gardening not because of social sanctions, but because the effort took away from other livelihoods activities (Interview #12). This was supported by a senior man and head of family (Interview #20) who argued that he, as a head of family, could not plant garden crops because there would be no grains. This speaks both to the role of a senior man as provider of food and grain to the household, and to the fact that gardening can take labor away from rain fed agricultural efforts. A senior man (Interview #70) put it another way, arguing he was too preoccupied with other crops to raise garden crops. Another senior man (Interview #22) argued that gardening required knowledge that he did not have (see also the senior men in Interviews #54, #70, #74, and #82). Women generally refer to market gardening as a source of money and vegetables, a balancing of their role as provider for their household in the form of the direct provision of food and as a means of providing capital inputs to meet household needs (see the senior women in Interviews #16 and #46, and the junior woman in Interview #30). Interestingly, the one senior man engaged with market gardening argued that it was a source of reliable income unaffected by variation in seasonal rain (Interview #54). As noted above, shea collection is clearly gendered, and may also have a seniority component among women. Nearly all non-farm employment is controlled by men, with the exception of a single senior woman engaged in small business. Generally, those not participating in NFE cited a lack

of experience or needed startup capital as the reason. There was no discussion of social sanctions attached to particular individuals and non-farm employment (NFE).



**Figure 5.3.11: Reported livelihoods activities of those with high livelihoods resource access, by gender/seniority cohorts.**

Nearly every member of The High Livelihoods Resource group cultivated peanuts (Figure 5.3.12). However, men were much more engaged in cultivating rain-fed staple grains (sorghum, maize, and millet) than women. Sorghum is the central staple grain for both junior and senior men, for as one senior man (Interview #5) observed, it is not possible to feed himself or his family with millet. Two other senior men (Interviews #74 and #82) explicitly linked sorghum cultivation to their role as men and providers of grain to the household. If sorghum is the primary grain focus for men, it is not the only grain with this value. One senior man (Interview #54) noted that men like him cultivate sorghum, millet, and maize to ensure the household has adequate grains (see also the senior men in Interviews #58 and #74). Another senior man (Interview #70) included cowpeas along with these three staple grains as food for household consumption. More senior men than junior men cultivated millet and rice. One junior man (Interview #03) claimed that millet required too much labor and was not a hardy crop, while another junior man (Interview #71) argued that millet was poorly adapted to local soils and levels of moisture. This slightly greater focus on the cultivation of staple grains by senior men reflects their specific role as providers of food and grain for the concession and household. Junior men were slightly less focused on this goal, forgoing higher rates of millet cultivation to grow gourds, fonio, and wandzou (groundnuts). On the whole, cotton is the purview of men, though one senior woman in this group was cultivating cotton. This appears to be a unique situation (see discussion below), as cotton is generally seen as a man's crop. Cowpeas, on the other hand, appear to be gendered in favor of women, though the very small sample size in this group makes this difficult to establish.



**Figure 5.3.12: The crop selections of those in the High Livelihoods Resource Access group in 2014.**

Examining why different members of the High Livelihoods Resource group cultivate the crops they do further clarifies their overall livelihoods strategies (Figure 5.3.13). Senior men cultivate cotton, peanuts, and occasionally sweet potatoes and watermelons with the goal of either selling all of the crop (cotton) or at least obtaining a marketable surplus of the crop. Many of these men mentioned that they cultivated cotton for the input credits, suggesting that they were using the fertilizers on other crops as well. On the other hand, senior men raise sorghum, maize, and millet as subsistence crops to ensure the grain supply of their families (senior man in Interview #24). The fact this man included cotton in this explanation further suggests that cotton inputs are used to support grain production as well.

Junior men also sell cotton and peanuts, and occasionally wandzou (Bambara nuts), in roughly the same manner as senior men. However, the motivations behind their staple grain production reflect their slightly different role in the concession and household. They cultivate sorghum with the intent of obtaining at least a small marketable surplus, as they do with virtually all other crops. Where a senior man might expect all of his staple grain production to be consumed by the family, junior men see opportunities to meet their obligations to the concession and household without using up all of their production. Junior men without wives need to generate a marketable surplus to purchase needed livelihoods assets and present themselves as viable husbands. Overall, this focus on market sale, whether the crop is grown exclusively for this purpose, or if it is only the surplus that is sold, explains why men are more preoccupied with markets challenges than women. It is telling that no junior men reported cultivating cowpeas, and the two junior men who commented on the use of cowpeas labeled them subsistence crops, suggesting that junior men were avoiding further cultivation of subsistence crops in favor of more marketable crops like wandzou. The only staple grains women in this group cultivate are peanuts. Senior women see this as a crop somewhat more for subsistence than sale, while the junior woman in this group saw it as a crop sold and eaten in more or less equal measures. On the whole,

women expected to cultivate marketable surpluses of all of their crops, but cultivated very few crops overall. Women were not primarily focused on market sale for any of their crops (with the exception of the senior woman cultivating cotton), explaining their relative lack of concern for market issues.

Batimakana High Livelihoods Resources Crop Uses

Peanuts				Sorghum			
	Avg	Interpreted value	n=		Avg	Interpreted value	n=
Senior men	3.2	Eat and sell equally	14	Senior men	1.1	Eat all	16
Junior men	2.8	Eat and sell equally	5	Junior men	1.8	Eat more than sell	5
Senior women	2	Eat more than sell	2	Senior women	n/a		
Junior women	3	Eat and sell equally	1	Junior women	n/a		

Cotton				Maize			
	Avg	Interpreted value	n=		Avg	Interpreted value	n=
Senior men	5	Sell all	12	Senior men	1.1	Eat all	10
Junior men	5	Sell all	5	Junior men	1	Eat all	5
Senior women	5	Sell all	1	Senior women	n/a		
Junior women	n/a			Junior women	n/a		

Cowpeas				Millet			
	Avg	Interpreted value	n=		Avg	Interpreted value	n=
Senior men	2	Eat more than sell	5	Senior men	1.1	Eat all	11
Junior men	1	Eat all	2	Junior men	1	Eat all	2
Senior women	2.5	Eat and sell equally	2	Senior women	n/a		
Junior women	3	Eat and sell equally	1	Junior women	n/a		

Sweet Potato				Wandzou			
	Avg	Interpreted value	n=		Avg	Interpreted value	n=
Senior men	2.66	Eat and sell equally	3	Senior men	n/a		
Junior men	n/a			Junior men	5	Sell all	1
Senior women	n/a			Senior women	3	Eat and sell equally	2
Junior women	2	Eat more than sell	1	Junior women	3	Eat and sell equally	1

Rice				Gourds			
	Avg	Interpreted value	n=		Avg	Interpreted value	n=
Senior men	1	Eat all	5	Senior men	2	Eat more than sell	1
Junior men	n/a			Junior men	2	Eat more than sell	1
Senior women	n/a			Senior women	n/a		
Junior women	n/a			Junior women	n/a		

Fonio				Okra			
	Avg	Interpreted value	n=		Avg	Interpreted value	n=
Senior men	1	Eat all	1	Senior men	2	Eat more than sell	1
Junior men	1	Eat all	1	Junior men	n/a		
Senior women	n/a			Senior women	n/a		
Junior women	n/a			Junior women	n/a		

Hibiscus				Cucumber			
	Avg	Interpreted value	n=		Avg	Interpreted value	n=
Senior men	2	Eat more than sell	1	Senior men	1	Eat all	1
Junior men	n/a			Junior men	n/a		
Senior women	n/a			Senior women	n/a		
Junior women	n/a			Junior women	n/a		

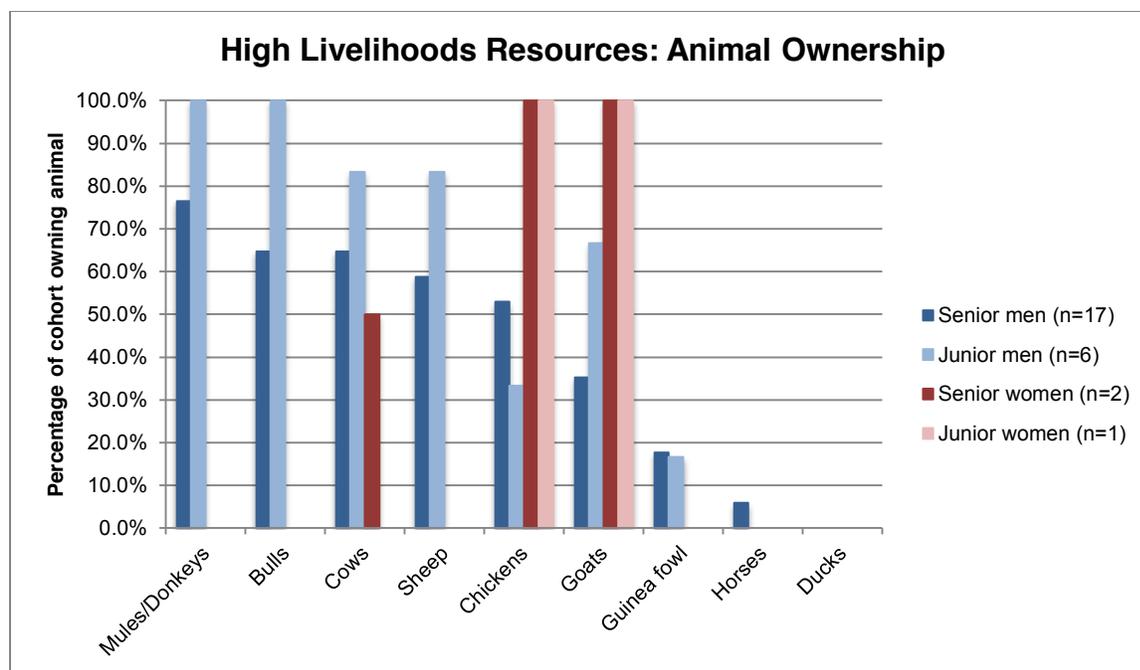
Watermelon			
	Avg	Interpreted value	n=
Senior men	4	Sell more than eat	1
Junior men	n/a		
Senior women	n/a		
Junior women	n/a		

**Figure 5.3.13: The uses for cultivated crops in the High Livelihoods Resource Group in 2014, divided by gender/seniority cohorts.**

The cycle lengths selected by members of this group further develops our understanding of their agricultural strategy. Most crops were hedged across long- and short-cycle varieties, with those having the longest cycles generally planted earliest, and therefore of the highest priority. For example, senior men planted sorghum on both 90-day and 110-day cycle. However, they planted 110-day cycles almost twice as frequently. Peanuts, on the other hand, were planted on both 90 and 120 day cycles, but

emphasis was on the shorter cycles. This suggests that peanuts were generally planted later than sorghum, and therefore of somewhat lower priority for these men. Similarly, more than half of senior men planted 90-day cycle maize, more than twice as many as planted 100- and 110-day cycles. This also suggests late planting. The only exception to this pattern was the relatively infrequently cultivated millet, which was planted on 90- and 110-day cycles, with about twice as many men planting the long-cycle varieties. Junior men planted somewhat longer cycle sorghum varieties than senior men (110- and 120-day), but shared the strong focus on 110-day cycles. Their peanut and maize variety selections were distributed in roughly the same manner as with senior men. This is not surprising, given junior men's need to check with senior men about agricultural decisions. Their variety selections for millet emphasized shorter cycles than senior men, with roughly half of junior men selecting 90-day cycles and half planting 110-day cycles. This might better reflect the place of millet in the crop hierarchy of junior men than the variety selections of senior men. Senior women planted longer cycle 120-day peanuts nearly twice as frequently as 90-day cycles, suggesting that they generally felt they had planted early enough to allow for longer cycles of this crop to mature.

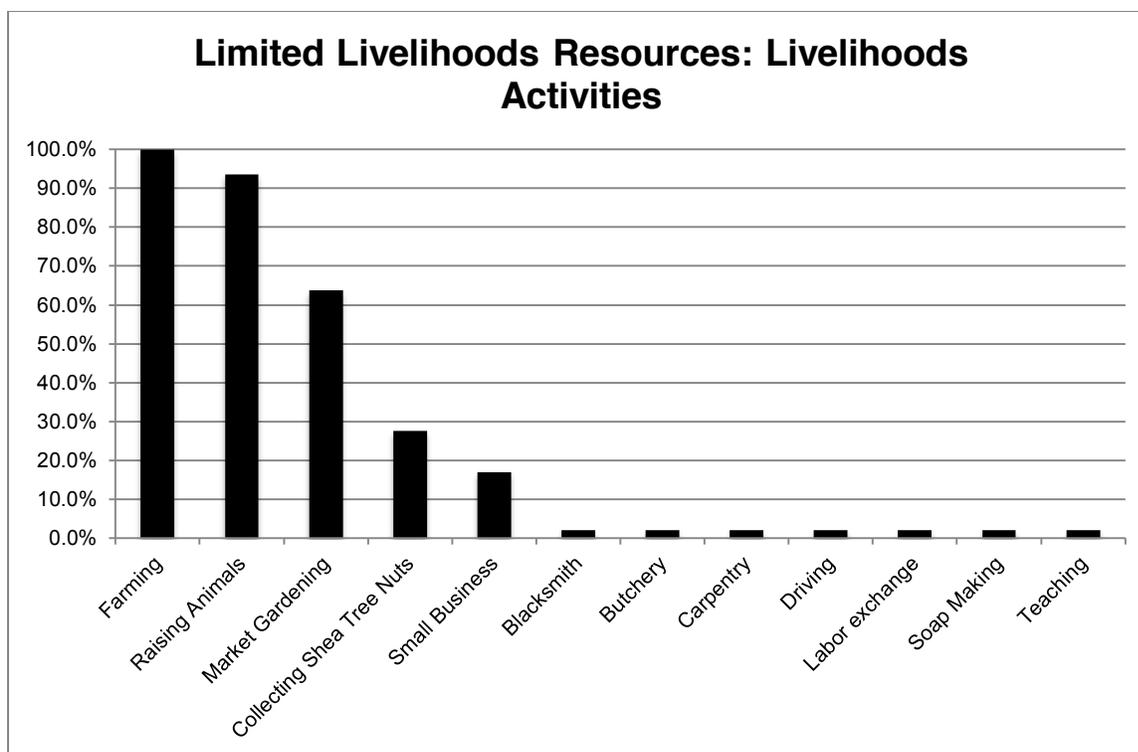
While animal ownership is widespread in the High Livelihoods Resource group, it is also highly gendered (Figure 5.3.14). Men own nearly all of the animals that serve as either major assets or provide traction on the farm. These include bulls and donkeys, which provide traction and (in the case of donkeys) transportation. Cows provide dairy products and reproduce, multiplying the size of the herd. One senior man (Interview #05) divided them up by purpose, saying bulls were for labor, cows for labor and reproducing more cattle, and mules were for domestic work. Most other men who owned cows noted their utility in producing milk. Men also exclusively own sheep, which are principally used for ceremonial or savings purposes. Junior men have higher rates of ownership of draught animals, goats, and sheep than senior men, but the relatively small number of junior men in this sample may be distorting this result. One senior woman (Interview #16) owns two cows, which she uses for dairy production and for reproduction. For these women, goats are for savings and for sale to purchase household needs. This describes the remaining animals, including chickens, ducks, and guinea fowl, which are used for sale, food, and eggs. Thus, men control the large animal assets, and the animal labor that facilitates agricultural work.



**Figure 5.3.14: The rates of animal ownership of members of the High Livelihoods Resource group in 2014.**

- 5.3.2.2 The Limited Livelihoods Resource group

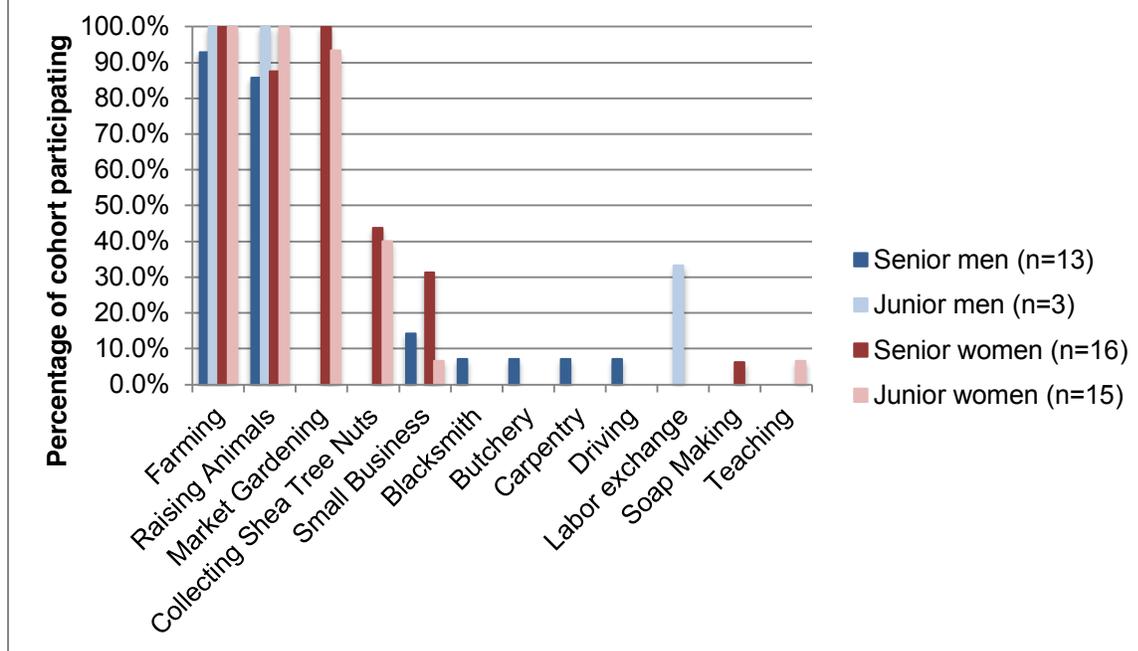
Members of the Limited Livelihoods Resource group are engaged in a somewhat wider range of activities (Figure 5.3.15). While agriculture and animal husbandry remain at the center of livelihoods, much of this group's additional activity takes place in the context of market gardening and shea nut collection. 31.5% of this group held some form of non-farm employment, suggesting that this group has less access to cash incomes via wage employment than the High Livelihoods Resource group. Nearly 28% of this group participated in the collection of shea nuts. While shea nut collection can be interpreted as an indicator of food insecurity during the hungry season, the fact that the rate of collection is higher in the Limited Livelihoods Resource group than the High Livelihoods Resource group is a function of the gendered character of this activity, and the increased number of women represented in this group.



**Figure 5.3.15: Reported livelihoods activities of those with limited livelihoods resource access.**

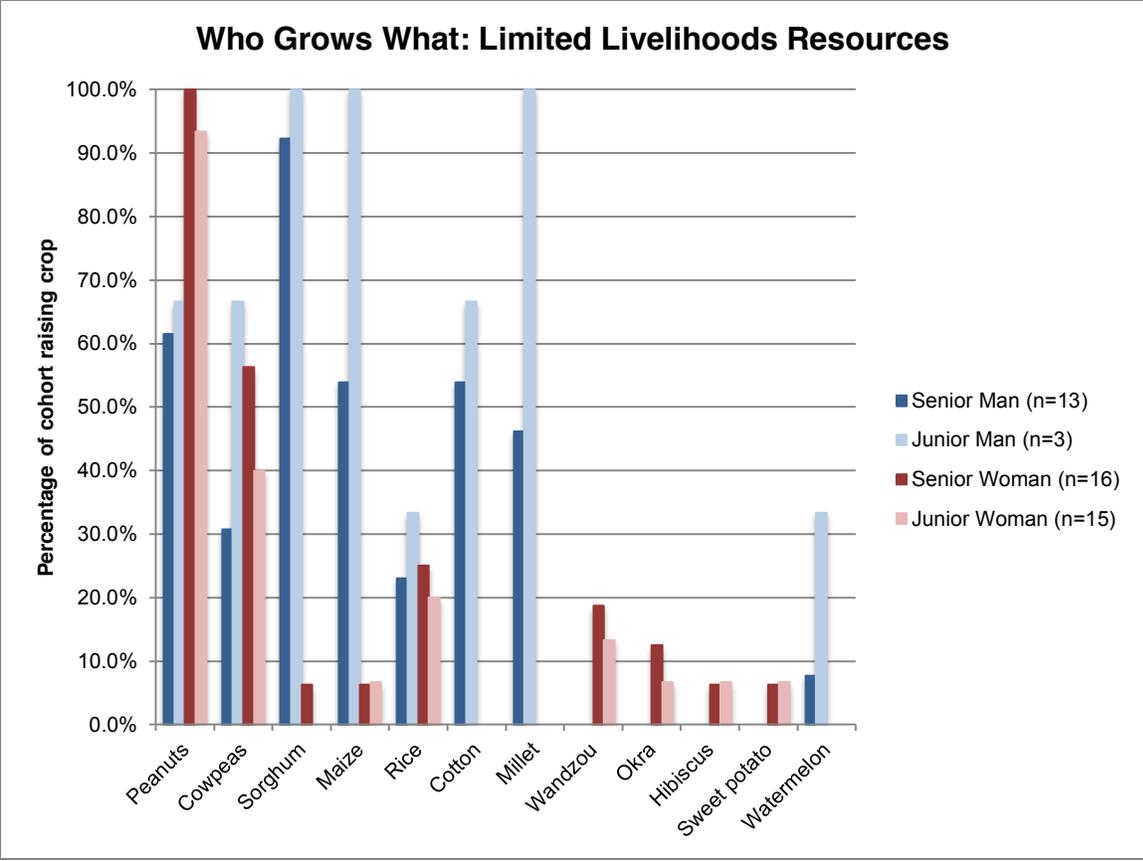
The gendered character of shea nut collection again points to the need to disaggregate these activities into sub-group cohorts by seniority and gender (Figure 5.3.16). In this group, gender clearly shapes the activities undertaken by particular individuals, but seniority does not appear to play as significant a role. Nearly all members of all cohorts participate in agriculture and animal husbandry. Women control market gardening and shea nut collection, while men control much of the NFE. While many members of this group argued that their lack of participation in NFE was tied to a lack of opportunity or knowledge of a given activity, one junior woman (Interview #02) and one senior woman (Interview #40) argued that NFE activities were fine for men, but regulated for women. A senior woman (Interview #04) added that women have never conducted NFE in Batimakana, hinting at a role/responsibility tied to gender in this community, at least for the members of this group. In contrast to the high livelihoods resource group, in this group market gardening is largely viewed as women’s work. For example, one senior woman (Interview #60) argued that if men started to grow garden crops, they would be seen as women, who are providers of food (see also the young women in Interviews #66 and #68). As providers of food, garden crops allow women to meet an essential part of the responsibilities attached to their identity, while also allowing them to earn money of their own. This money, however, is often reinvested in the household, spent on other food, fertilizer, herbicides, and other household expenses. Senior women have higher rates of small business participation than either men or junior women. Shea nuts are used for both food and raising small amounts of money to supplement household incomes. In this group, one junior women (Interview #49) and two senior women (Interview #67 and #83) mentioned shea collection as a means of meeting their own financial needs, suggesting this activity goes beyond merely supplementing women’s roles as providers of food and needed household resources.

## Livelihoods activities by cohort: Limited Livelihoods Resources



### 5.3.16: Reported livelihoods activities of those with limited livelihoods resource access, by gender/seniority cohorts.

While agriculture is a nearly universal activity in this group, crop selection varies by seniority and gender (Figure 5.3.17). A greater percentage of women cultivate peanuts than men, and they control the production of garden crops like Wandzou (groundnuts), okra, hibiscus, and sweet potatoes. Men cultivate cotton, millet, and watermelon, and dominate the cultivation of sorghum and maize. Junior men cultivate maize, millet, beans, and watermelon at higher rates than senior men. There is very little difference in the percentage of junior and senior women cultivating any of these crops. The influence of individual roles and responsibilities is visible in this pattern. Men control the productive assets necessary to cultivate cotton (see animal husbandry discussion below), and this crop is largely associated with men's production. Nearly all of the women in this group who explained why they were not cultivating cotton blamed the situation on a lack of access to these productive resources, and none mentioned a prohibition against the cultivation of cotton by women. Only one junior woman (Interview #66) said men had to authorize women to raise cotton, while another (Interview #86) said this work is customarily for men. As in the High Livelihoods Resource group, men in the Limited Livelihoods Resource group prioritize the cultivation of sorghum because it is better suited to their soils and climate than millet and other grains. One senior man (Interview 011) argued that grains other than sorghum and peanuts required better soils or huge amounts of input to obtain enough production to justify the expense and effort (see also the senior man in Interview #15). In this group, the pattern of crop selection is somewhat surprising. Junior men are cultivating staple grains at higher rates than senior men. Generally, senior men are expected to bear a greater responsibility for concession and household food security than junior men. However, in this group junior men appear substantially more agriculturally productive than senior men, cultivating garden crops like beans and watermelon at higher rates than senior men as well. This pattern was somewhat evident in the 2012 dataset as well, suggesting this is not an artifact of the small sample size of junior men.



**Figure 5.3.17: The crop selections of those in the Limited Livelihoods Resource group in 2014.**

The somewhat reversed roles of junior and senior men persist when we examine the uses individuals foresee for their crops (Figure 5.3.18). Not only are junior men cultivating staple grains more frequently than senior men, junior men are more subsistence-oriented in their production than senior men. For every crop they both cultivate, senior men are slightly-to-substantially more oriented toward market production than junior men. The vast majority of these men explicitly mention sale and consumption as uses of these crops, sometimes emphasizing consumption over sale, and other times drawing no distinction. The production of a surplus for sale is somewhat interesting, in that most senior men, when explaining why they were not cultivating millet or maize, argued that they lacked the labor resources needed. In short, senior men still produce a subsistence crop with these grains, especially sorghum, but when they select a crop they appear to do so with an eye toward maximizing yields under conditions of constrained labor and resources to allow for a marketable surplus. Junior men in this group effectively cultivate staple grains for subsistence without much hope of a marketable surplus, an emphasis that extends to rice production. This pattern is more generally associated with senior men in other parts of southern Mali, and is not consistent with the 2012 dataset. In 2012, senior men were more subsistence oriented than represented in the 2014 sample. In this sample, junior men were slightly more market oriented than in 2014. It is unclear why these two samples deviate from expectations in this manner. Among women, crops are principally cultivated for consumption, but they have a clear expectation of a marketable surplus for virtually every crop grown. This aligns with a woman’s responsibility to meet the needs of the household with her labor. The only significant divergence in use among women is for sweet potatoes, which senior women see as more for sale than consumption, while junior women see them as more for consumption than sale. However, only one junior and one senior woman were cultivating these

crops, and therefore these perceptions may be idiosyncratic. As no women reported growing these crops in 2012, we cannot use that dataset to address this issue..

### Batimakana Limited Livelihoods Resources Crop Uses

Peanuts				Sorghum			
	Avg	Interpreted value	n=		Avg	Interpreted value	n=
Senior men		3 Eat and sell equally	5	Senior men	1.17	Eat all	12
Junior men		2 Eat more than sell	1	Junior men		1 Eat all	2
Senior women	2.27	Eat more than sell	15	Senior women	n/a		
Junior women	2.46	Eat more than sell	13	Junior women	n/a		

Cotton				Maize			
	Avg	Interpreted value	n=		Avg	Interpreted value	n=
Senior men		5 Sell all	3	Senior men	1.29	Eat all	7
Junior men		5 Sell all	1	Junior men		1 Eat all	2
Senior women	n/a			Senior women		2 Eat more than sell	1
Junior women	n/a			Junior women		2 Eat more than sell	1

Cowpeas				Millet			
	Avg	Interpreted value	n=		Avg	Interpreted value	n=
Senior men		3.5 Sell more than eat	2	Senior men		1 Eat all	5
Junior men		3 Eat and sell equally	2	Junior men		1 Eat all	2
Senior women		2 Eat more than sell	6	Senior women	n/a		
Junior women	1.33	Eat all	6	Junior women	n/a		

Sweet Potato				Wandzou			
	Avg	Interpreted value	n=		Avg	Interpreted value	n=
Senior men	n/a			Senior men	n/a		
Junior men	n/a			Junior men			
Senior women		4 Sell more than eat	1	Senior women		1 Eat all	1
Junior women		2 Eat more than sell	1	Junior women	n/a		

Rice				Okra			
	Avg	Interpreted value	n=		Avg	Interpreted value	n=
Senior men		3 Eat and sell equally	1	Senior men	n/a		
Junior men		1 Eat all	1	Junior men	n/a		
Senior women		2 Eat more than sell	4	Senior women		2 Eat more than sell	1
Junior women		2 Eat more than sell	2	Junior women	n/a		

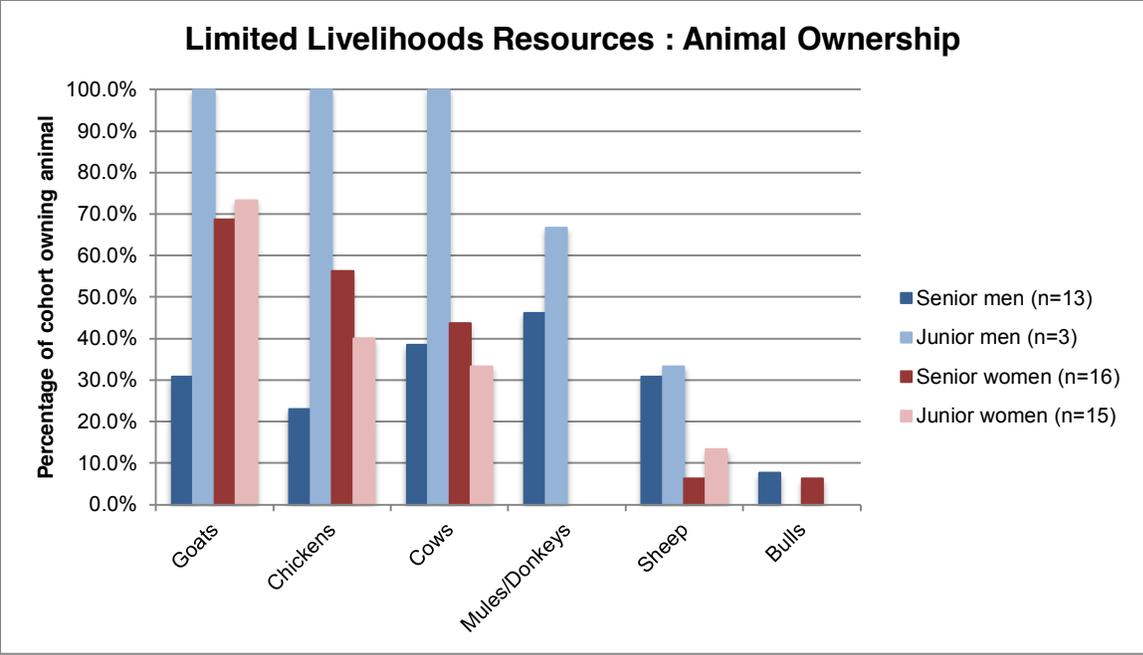
Hibiscus				Watermelon			
	Avg	Interpreted value	n=		Avg	Interpreted value	n=
Senior men	n/a			Senior men		4 Sell more than eat	1
Junior men	n/a			Junior men	n/a		
Senior women		2 Eat more than sell	1	Senior women	n/a		
Junior women	n/a			Junior women	n/a		

**Figure 5.3.18: The uses for cultivated crops in the High Livelihoods Resource Group in 2014, divided by gender/seniority cohorts.**

Senior men in the Limited Livelihoods Resource group planted a wider range of sorghum cycle lengths than their counterparts in the High Livelihoods Resource group, with somewhat greater focus on shorter cycles. Their emphasis, however, still fell on 110-day cycles. Their peanut and millet variety selections reflected the same emphases as senior men with equipment, animals, and labor. They were slightly more focused on short-cycle varieties of maize than their counterparts with equipment, animals, and labor. This suggests a similar hierarchy of crop importance, with sorghum the key grain. Junior men in the

Limited Livelihoods Resource group planted cycles of peanuts and sorghum very similar to those cultivated by junior men in the High Livelihoods Resource group. They planted shorter-cycle maize, on average, than junior men with adequate equipment, animals, and labor, but planted longer-cycle millet. This suggests that maize is even less of a priority for these men, whose seasons are greatly shortened by the need to wait for animals or equipment. Senior women in the Limited Livelihoods Resource group focused more on the cultivation of short-cycle peanuts than senior women in the High Livelihoods Resource group, likely a product of the fact that their planting is more delayed than women with greater livelihoods resource access. They also cultivated 110-day cycle sorghum (on the long side) and 90-day cycle maize (a short cycle), but in very small numbers that are difficult to interpret beyond individual ideosyncrasy. Junior women cultivated peanuts with the same cycle distribution as junior women with equipment, animals, and labor. The one junior woman who cultivated maize used a 110-day cycle, which is a long cycle but difficult to interpret in a general manner.

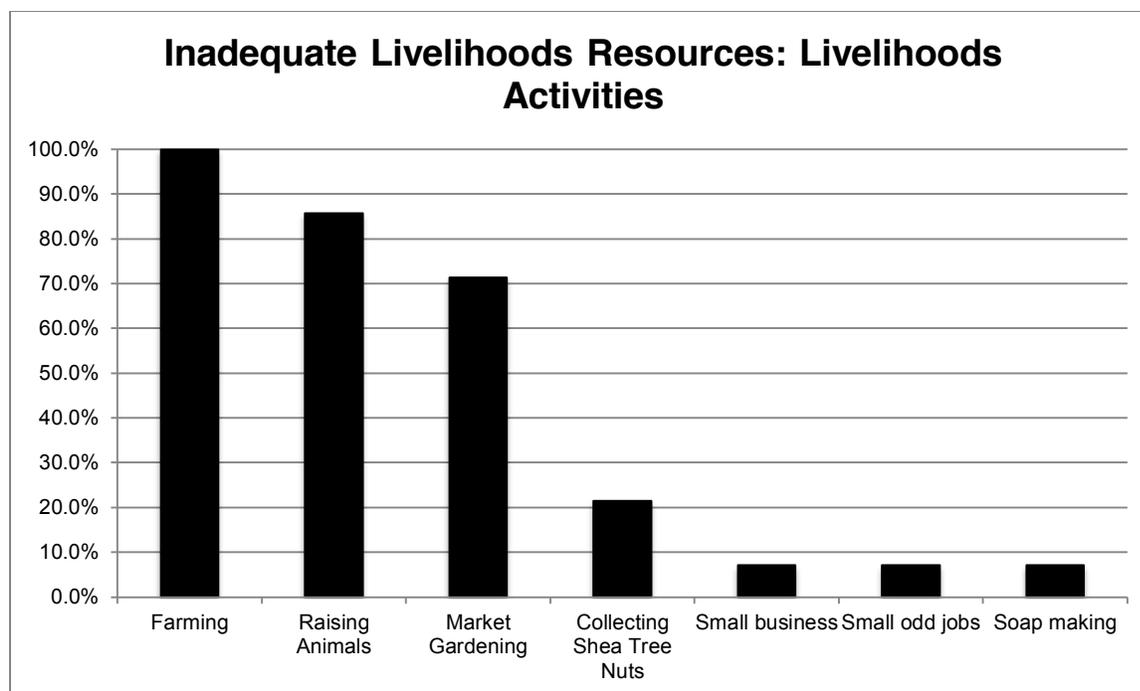
In The Limited Livelihoods Resource group, the patterns of animal ownership are also contrary to what is both expected given roles and responsibilities in Batimakana, and what was observed in The High Livelihoods Resource group (Figure 5.3.19). Men, both senior and junior, control ownership of mules and donkeys, and have significant control over sheep. Sheep are used by these men as a means of saving farm and other income, and for sacrifices at Tabaski. Junior men also record the highest rates of ownership of goats, chickens, and cows, with senior men reporting very low rates of ownership for all three. The very small group of junior men in this group (n=3) makes it difficult to interpret their rates of ownership as representative of others in their situation, except to say that these junior men are remarkably asset-rich and therefore likely to have the flexibility and assets needed to meet most day-to-day challenges in their households. This aligns with their stated agricultural activities, from crop selection to crop use. Women record very similar rates of ownership for goats, chickens, and cows across junior and senior cohorts. Their rates of cow ownership are as high as those of senior men, which runs against the expectations created by The High Livelihoods Resource group. However, The Limited Livelihoods Resource group women's greater focus on raising chickens and goats than senior men is very similar to that seen in The High Livelihoods Resource group. Women generally focus on fowl and goats as these are animals that are used for savings so that, should the need arise, resources exist to address household or personal challenges through provision of needed small capital inputs or food.



**Figure 5.3.19: The rates of animal ownership of members of the Limited Livelihoods Resource group in 2014.**

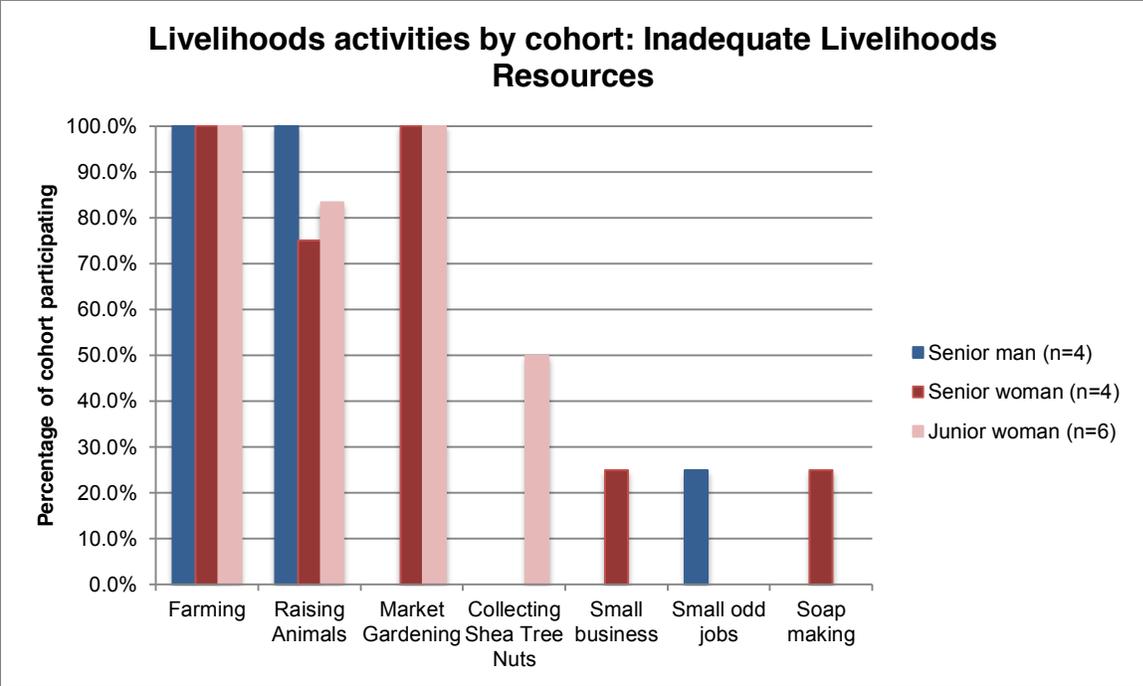
- 5.3.2.3 The Inadequate Livelihoods Resource group

The livelihoods activities of The Inadequate Livelihoods Resource group resemble the patterns of activity in the Limited Livelihoods Resource group, though rates of animal husbandry and shea nut collection are lower in the Inadequate Livelihoods Resource group, and rates of market gardening are somewhat higher (Figure 5.3.20). This group has the lowest rate of participation in NFE, at 21.3%, giving it the highest dependence on agricultural activities, animal husbandry, and shea gathering for livelihoods of any group.



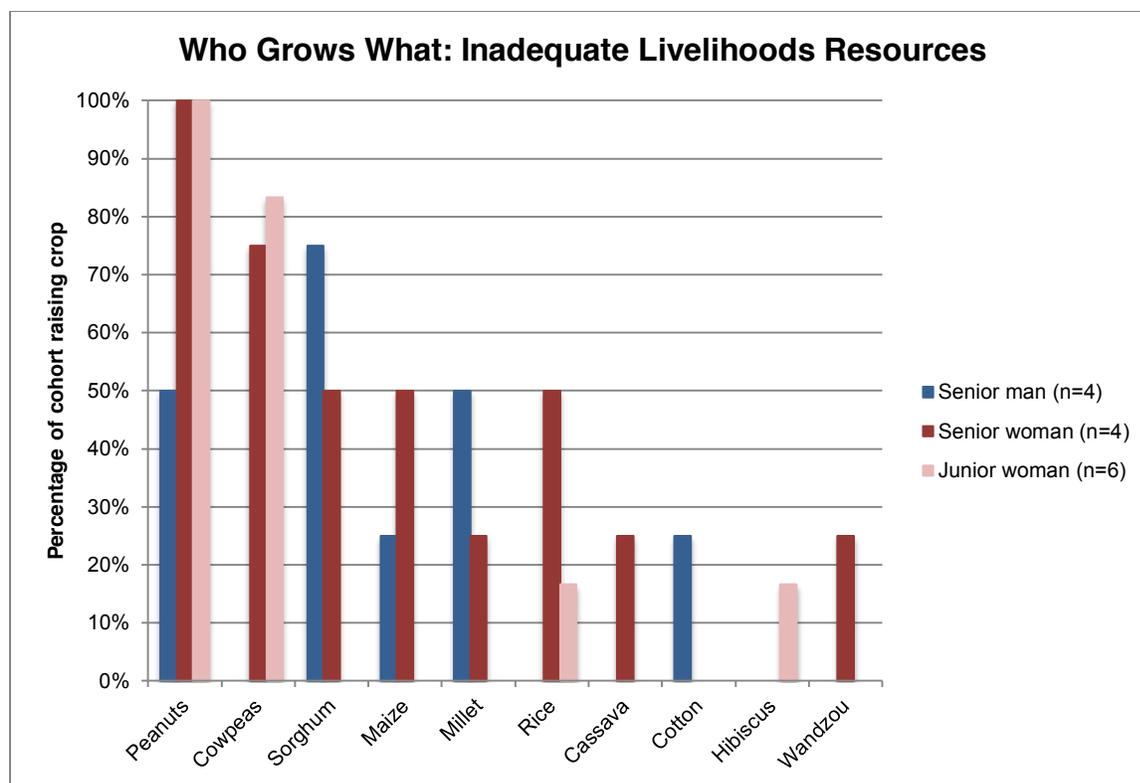
**Figure 5.3.20: Reported livelihoods activities of those with inadequate livelihoods resource access.**

While the Inadequate Livelihoods Resource group is small (n=14), the patterns of participation in livelihoods activities by seniority and gender largely conform to those seen in High and Limited Livelihoods Resources groups (Figure 5.3.21). All members of this group participate in agriculture. All men (in this group, all of the men were senior men) participate in animal husbandry, with 75% of senior women and 83% of junior woman also raising animals. Market gardening remains the purview of women, who also control shea collection and most of the very limited NFE in this group. As one junior woman (Interview #78) noted, market gardening allows women to provide food for the household, and supplement the resources of the household. This representation of market gardening supports women’s roles as providers of food, while allowing them to financially support household needs without challenging the authority or status of their husbands or other men in the family. Senior women controlled women’s NFE, while junior women controlled shea collection. While women in this group, as in Groups 1 and 2, cited a lack of capital and experience for the reasons why they did not participate heavily in NFE, far more women in this group than in any other argued that women’s participation in these activities were regulated by the community. This suggests that, at least for this group, women felt that social expectations heavily constrained in their efforts to secure NFE. These regulations seem to fall more heavily on masonry and sorcery, while participation in a small business generally seems to be a question of capital and knowledge. This pattern conforms to patterns seen in other groups in Batimakana, and in other parts of southern Mali, where men control wage labor and women dominate small business. As in other groups, shea production falls to women, who use it both for food and as a means of raising money to supplement household needs. Only one junior woman (Interview #47) mentioned this activity as a means of meeting her own needs, as opposed to supplementing the income of her household and concession.



**Figure 5.3.21: Reported livelihoods activities of those with inadequate livelihoods resource access, by gender/seniority cohorts.**

While everyone in the Inadequate Livelihoods Resource group participates in agriculture, patterns of crop selection varied by gender and seniority (Figure 5.3.22). Men cultivated peanuts, sorghum, millet, and maize, meeting their responsibility to provide food and grain for the family. Senior women had the highest rates of cultivation for peanuts, cowpeas, and maize, but also cultivated staple grains sorghum and millet at about half the rate of men. This rate of women’s staple grain production is much higher than in any other group, where men thoroughly dominated the cultivation of these crops. Junior women cultivated peanuts and cowpeas at the same rate as senior women, and little else. As one senior woman (Interview #34) argued, her role was to produce the vegetables (in this she included peanuts) that, in meals, complemented the grain produced by men. Women also exclusively cultivated rice, hibiscus, and cassava. This pattern is largely in line with expectations from previous groups. Only half of the men cultivated peanuts themselves, and none raised vegetables, because they struggle to raise adequate sorghum, millet, and maize to meet their grain provision obligations.



**Figure 5.3.22: The crop selections of those in the Inadequate Livelihoods Resource group in 2014.**

When we examine what crops are used for in this group, an explanation for the patterns of cultivation above emerges (Figure 5.3.23). Senior men cultivate sorghum, maize, and millet for subsistence, as a means of meeting their role as the providers of food for their household and concession. They cultivate peanuts, however, principally for sale. This may be a substitute for cotton production. While the labor and equipment requirements for cotton are largely out of reach for men in this group, the one man who cultivates cotton (Interview #81) also cultivates peanuts for sale more than for consumption. As in this group peanuts are not seen as grains for the household, senior men see them as of secondary importance and will only cultivate them to the extent available equipment, tools, and labor allow. This also explains why these men were only cultivating staple grains. Women, on the other hand, cultivated all of their crops for subsistence, though at times they expected a marketable surplus. Junior women were most confident of a surplus with beans and peanuts, while senior women were most confident of some surplus with peanuts.

## Batimakana Inadequate Livelihoods Resources Crop Uses

Peanuts				Sorghum			
	Avg	Interpreted value	n=		Avg	Interpreted value	n=
Senior men	4.5	Sell all	2	Senior men	1	Eat all	3
Senior women	1.75	Eat more than sell	4	Senior women	1.5	Eat more than sell	2
Junior women	2	Eat more than sell	6	Junior women	n/a		

Cotton				Maize			
	Avg	Interpreted value	n=		Avg	Interpreted value	n=
Senior men	5	Sell all	1	Senior men	1	Eat all	1
Senior women	n/a			Senior women	1	Eat all	2
Junior women	n/a			Junior women			1

Cowpeas				Millet			
	Avg	Interpreted value	n=		Avg	Interpreted value	n=
Senior men	n/a			Senior men	1	Eat all	2
Senior women	1.33	Eat all	3	Senior women	1	Eat all	1
Junior women	2	Eat more than sell	5	Junior women	n/a		

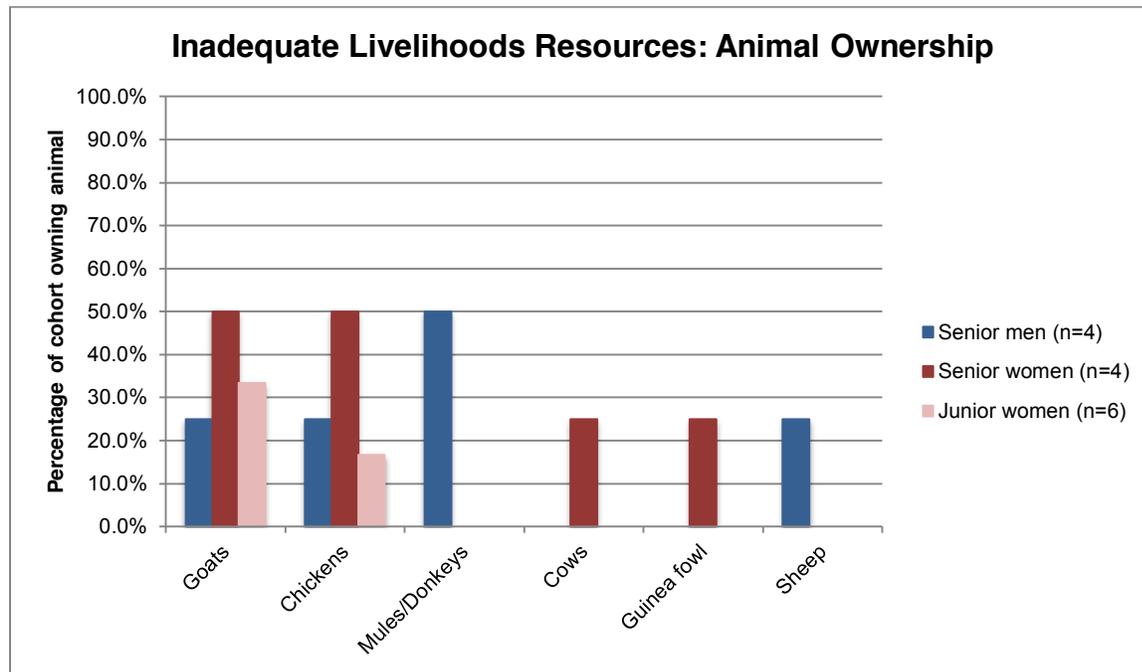
Rice				Wandzou			
	Avg	Interpreted value	n=		Avg	Interpreted value	n=
Senior men	n/a		1	Senior men	n/a		
Senior women	1.5	Eat more than sell	2	Senior women	1	Eat all	1
Junior women	1	Eat all	1	Junior women	n/a		

**Figure 5.3.23: The uses for cultivated crops in the Limited Livelihoods Resource Group in 2014, divided by gender/seniority cohorts.**

Both senior men and senior women in this group evenly distributed their sorghum and millet cycle selections across short and long cycles, and selected short cycle maize and peanuts. These individuals are all selecting the shortest cycles, suggesting that they have very little season left when they start planting, and therefore have very little choice in the cycle lengths they can select.

In this group, the choices of crops and their uses are shaped in part by the access of individuals to animals (Figure 5.3.24). Animal ownership is relatively low in The Inadequate Livelihoods Resource group overall, and very few members of this group have access to animal traction (two senior men). Men have fairly low rates of goat and fowl ownership, and do not own cows. A few men own draught animals

and sheep. The low rates of traction animal ownership force these men to prioritize their crops as they cannot cultivate quickly or cover much area with the resources at hand. Women own goats and fowl, which provide them with a means of savings and with sources of capital for meeting household needs. One junior woman (Interview #10) reported using chickens for food, as well as for savings and sale. Whatever the use, the rate of ownership of both animals is very low among women, suggesting that incomes in this group do not allow for their purchase. The senior woman (Interview #78) who owns a cow received it when she got married, and uses it principally for milk, manure, and ideally to obtain more cows if it becomes pregnant



**Figure 5.3.24: The rates of animal ownership of members of the Limited Livelihoods Resource group in 2014.**

### 5.3.3. TOOLS OF COERCION IN BATIMAKANA

The roles and responsibilities of residents of Batimakana are enforced by clear sanctions for those who do not meet community expectations. These were broadly agreed-upon across the interviewees in this village, and help to explain the uniformity of activities and decisions associated with particular identities. Perhaps most important of these were the strong sanctions against anyone who ignored or disobeyed the directions of the head of the family or household. The weakest sanction for this offense mentioned by residents was to be counseled on appropriate behavior by other members of the family. Men tended to describe this as their responsibility, such as one senior man (Interview #13) who argued that if someone disobeyed him, he corrected the behavior and that was the end of the problem. Another senior man (Interview #77) said that if anyone contradicted him, he corrected them or sent them out of the house. While senior men appear to be those most responsible for counseling and correcting those who disobey their instructions, some junior men reported playing this role as well. For example, one junior man (Interview #3) noted that if anyone disobeyed his decisions, he corrected them. As junior men do not give instructions to senior men, it appears that when junior men made this claim they were referring to the decisions of those in their households, not the larger family or community.

The act of “counseling” those who disobey or contradict those with recognized decision-making authority in their household or family often included clear efforts to force the wayward member of the

community to accept these decisions. These efforts clearly rest on an escalating set of sanctions for those who will not accept correction. Those who persist in ignoring or contradicting the decisions of more senior members of the household or family will, at first, find themselves excluded from household and family activities. For example, one senior woman (Interview #35) noted that anyone who disobeyed the head of family's decisions would be either reprimanded or excluded from household activities. Generally, this sanction was often associated with reprimand, suggesting it was one step further up the scale of escalating sanctions from "counseling." Those who persist in questioning or ignoring senior leadership will, as one junior woman (Interview #52) noted, then be driven from the household or family, and left to care for themselves. This is a very harsh sanction, as it removes the offender from access to land, access to household resources, access to the labor and support of others in the household or family, and generally any means of making an independent living in the community.

While there are clear sanctions, and a clear hierarchy of sanctions, in place for those who challenged the conventions of decision-making and authority in Batimakana, these do not appear to be sanctions that are employed frequently. One senior man (interview #43) noted that it was rare to see anyone disobeying senior men, or challenging their authority. The severity of the sanctions for those who challenge this order make such challenges extremely risky and costly, and therefore uncommon.

While decision-making structures are strongly enforced across all identities in Batimakana, there are particular expectations and sanctions that are attached to particular identities in the community. These are most clearly defined by gender, but there are many suggestions of different expectations of residents by seniority. Though senior men may hold the authority in Batimakana, they are expected to play their role – that is, to make wise decisions about livelihoods and agricultural activities, and to organize the family and household such that these activities produce the food and income needed to meet everyone's needs. Failure to live up to these expectations will result in their marginalization from the family and the household. One senior man (Interview #20) noted that such marginalization would include being separated from all decision-making; being excluded from household, family, or community secrets; and not being consulted for advice or being taken into confidence by others. For example, one senior woman (Interview #40) argued that nobody would address such a man with serious concerns. This reflects the loss of confidence such a man would experience in the eyes of his family and community. Senior men are by definition decision-makers and leaders, and therefore to be marginalized and to lose the confidence of others is to fundamentally lose one's identity. Other sanctions include losing the respect of one's wife and being divorced. This, too, fundamentally challenges men's identity as those who make decisions for their household or family.

Junior men can also find themselves excluded from decisions and activities, which strips them of assets through which they might improve their livelihoods and status, explaining why being unable to find a wife was a common sanction mentioned for junior men who did not live up to their roles and responsibilities. This sanction is most clearly targeted at junior men, though it could impact a senior man seeking to marry a second or third wife. Rarely mentioned were sanctions such as being forced to leave the village. This may be because any man who had fundamentally lost his identity and his connection to a family would have no choice but to leave the community, and therefore most men do not see this as a sanction distinct from those associated with the loss of respect and authority. As one senior man (Interview #21) noted, a man who had lost the confidence of the community and who was marginalized by his family and household would be a laughingstock who had to leave. Another senior man (Interview #19) agreed, noting that sometimes a man would be obliged to leave the village under these circumstances because of the shame attached to them.

On the other hand, women's sanctions were strongly slanted toward material punishments for transgressive behavior. The most commonly-mentioned sanction for a woman who failed to live up to

the expectations of her role and responsibility was divorce, while being beaten, being excluded from favors or benefits generally given to women, and being sent back to her parents were also mentioned. These are all threats to the material well-being of women, except for the threat of return to her parents, which likely includes demands on her family for return of dowry and therefore might be viewed as a threat to the woman's family. Further, this last threat only applies to junior women, as a senior woman likely has been married for too long for a return of dowry to be possible, and may not have any surviving relatives to whom she might be sent. Such threats are aimed more at the physical condition of women, and less targeted at women's status. However, a disobedient or otherwise disrespectful woman would clearly be marginalized in the community and family, will lose the respect of the community and be criticized for her behavior, would bring shame to her family and community, and give her children a bad reputation. Thus, sanctions aimed at women target their material well-being more than their gendered identities. A significant number of residents argued that before any material or other sanctions were applied, a wayward woman would be counseled with regard to her behavior and the expectations the household, family, and community had of her.

There was a single senior woman who pointed out that if a woman was powerful enough that she could dominate her husband, then she would experience few consequences for transgressing expected roles and responsibilities. This suggests there are avenues by which a senior woman can extend her leadership role beyond that of leading women to leading or pressuring the senior men who lead her household or family without sanction.

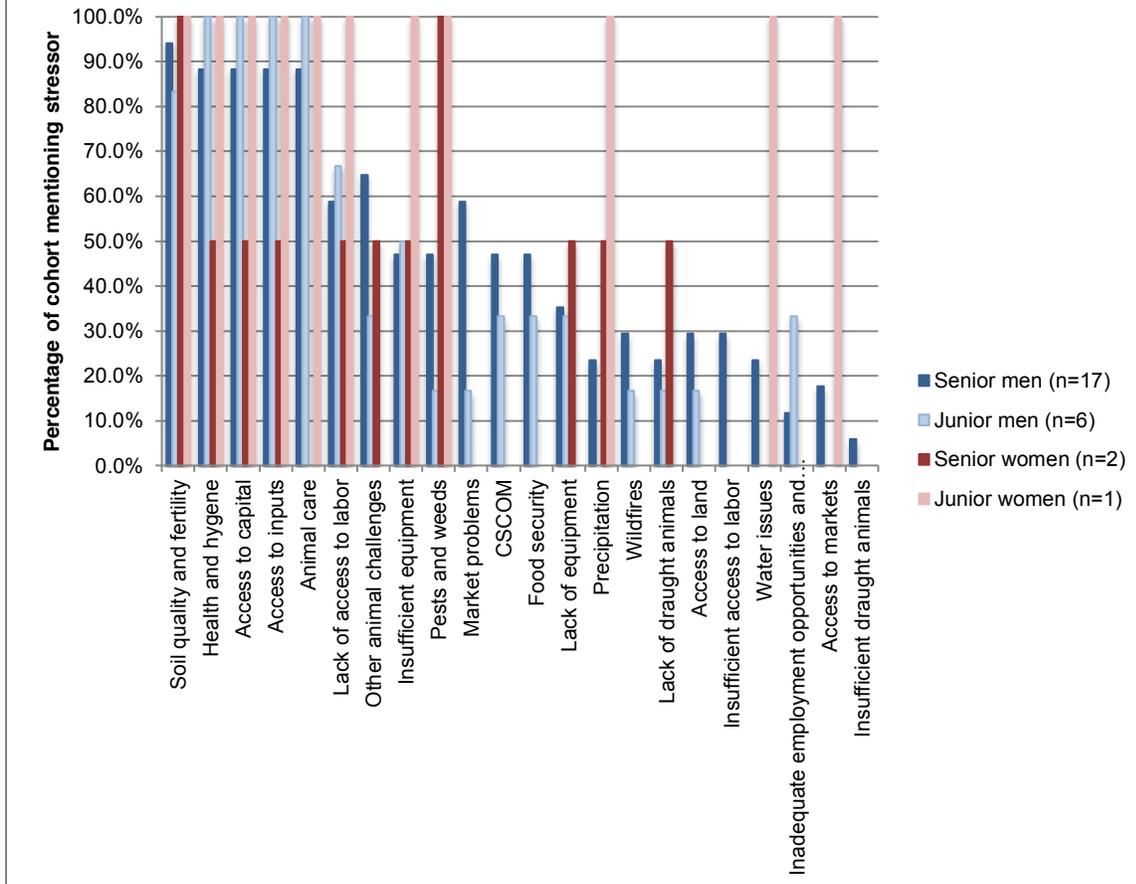
Overall, in Batimakana there is a strong system of enforcement that brings about conformity with the decisions and instructions of senior men at the level of the family and the household. There is little tolerance for those who dispute the authority or decisions of senior men, and any divergence from expected responsiveness to the directions of senior men will be met with immediate correction, whether through verbal reprimand or the removal of access to livelihoods resources. Therefore, the residents of Batimakana are unlikely to adopt any decisions that were not first made by senior men, or at least approved by senior men. At the same time, senior men risk the loss of their very identity each year as they make decisions about what to plant and when to plant it. This presents an opportunity to use advisories to help these men achieve these goals, which would empower others in the community to use the advisories as well.

#### **5.3.4. BATIMAKANA: DIFFERENT VULNERABILITIES, DIFFERENT DECISIONS**

The foregoing discussion of identity, livelihoods, and tools of coercion in Batimakana allows us to rigorously interpret the sources and implications of the different assemblages of vulnerability at play in Niamaasso. This, in turn, allows us to better see the potential utility of climate services to different residents of this village, and the larger livelihoods zone to which it belongs.

The assemblages of vulnerability in the **High Livelihoods Resource group** reflect that the members of this group live in secure households where year-to-year agricultural production is more than adequate for household needs (Figure 5.3.25). In general, members of this group are not concerned with access to equipment and animal traction, the principal limiters of agricultural production. Instead, the stressors members of this group report are those that limit their production of marketable surpluses. For example, the equipment concerns of most in this group are for *insufficient* equipment, not an absolute lack of equipment. This concern reflects a desire to increase existing production, often to create a marketable surplus. Nearly all men were cultivating significant fields and had means of addressing food insecurity through other forms of income. Further, the central concerns in this group centered on soil fertility and inputs, as these are the principal limiting factors for agricultural production after equipment concerns have been met.

## Batimakana: High Livelihoods Resources Assemblages of Vulnerability



**Figure 5.3.25: Assemblages of vulnerability by seniority and gender in the High Livelihoods Resources group in 2014.**

There were differences in the assemblages of vulnerability in this group. Senior men with animals, equipment, and labor appear to be very secure in Batimakana. Many of these men wish to expand their production as a means of building wealth, but they do not need to do so as a matter of food security. Senior men were concerned with a lack of labor. One senior man (Interview #1) noted that those who did not cultivate peanuts, sorghum, millet, and maize suffered from a lack of manual labor, and noted that his own inability to cultivate cotton stemmed from a lack of labor in his cotton fields. Other senior men (Interviews #5, #43, and #59) also cited a lack of labor in their cotton fields as a problem limiting their participation in this activity. However, some senior men reported concerns for *insufficient* levels of labor. This reflects the fact that many senior men are the decision-makers for families, from which they can draw labor for agricultural activities. Therefore, these men are more likely to desire greater amounts of labor, but likely already have access to labor. Other senior men are not able to access labor to the same degree, and therefore report concerns with *lack* of labor. Senior men are also most preoccupied with market issues, as they produce cotton and marketable surpluses of other crops.

Some of these men (Interviews #01, #38, #58, and #82) already base their decisions on a mixture of traditional knowledge and meteorological information. Several senior men (Interviews #01, #05, and #57), mentioned the flowering of shea trees, bara, Kegnou, and Tômi as indicators that the season has begun, while others followed the traditional practice of preparing for planting by the seventh lunar month (Interviews #24, #43, #57, and #59). Two others mentioned the appearance of birds like cranes and douga (Interview #7), or when storks nest (Interview #5) as an indicator of approaching rains. The high prevalence of senior men using traditional means of decision-making exclusively suggests that the forecasts they hear are not as reliable as these traditional sources of information. Here, we note these are forecasts, as only a few of these men appear to be using the advisories as designed, which would make them more accurate and potentially more useful. Making the advisories salient to these men will be challenging, as advisories for millet, maize, and cotton will likely be of limited utility. Cotton varieties seem to be selected for the farmers by CMDT. These men, along with junior men, are likely the only ones who will have use for millet and maize advisories, as these crops require a great deal of labor and input to survive in this cluster. For others without such resource access, even the best advisory might not offset the challenges that local agroecology present to these crops. These men have the equipment, labor, and animal traction to act quickly on advisories, if they were salient, credible, and reliable.

Junior men in this group, like senior men, have relatively few concerns for access to animals and equipment. They do have some stresses around adequate labor supplies for their farms, as they cannot draw on a larger family to ensure their own production. Junior men, even those with animals, equipment, and labor, have little decision-making authority with regard to agricultural practice. Further, while they are capable of producing marketable surpluses of staple grains, they are constrained by the same agroecology that makes maize and millet production challenging and resource-intensive. As soil quality appears to be a large determinant of these challenges, the advisories cannot help to overcome this challenge, meaning that on the whole advisories for millet and maize will not be of much use to these men. As with senior men, those junior men who cultivate cotton appear to do so with varieties selected by CMDT, and therefore advisories have limited efficacy for this crop as well. The junior men in this group mix observations of precipitation with forecast information (Interview #12, #63, #72) to decide when to start different agricultural activities. Others look to the arrival of birds like cranes and douga (Interview 03), to advice from senior men (Interview #71) to mark the start of the season or the coming of the rains. One man noted that he looked for the ripening of fruit on Shea and dougoura trees to mark the start of the season. Efforts to make these advisories salient to the needs of junior men will be challenging, as the combination of limiting agroecology, decision-making control over cotton resting with CMDT, and most other decisions resting with senior men means they often will not be able to act on them.

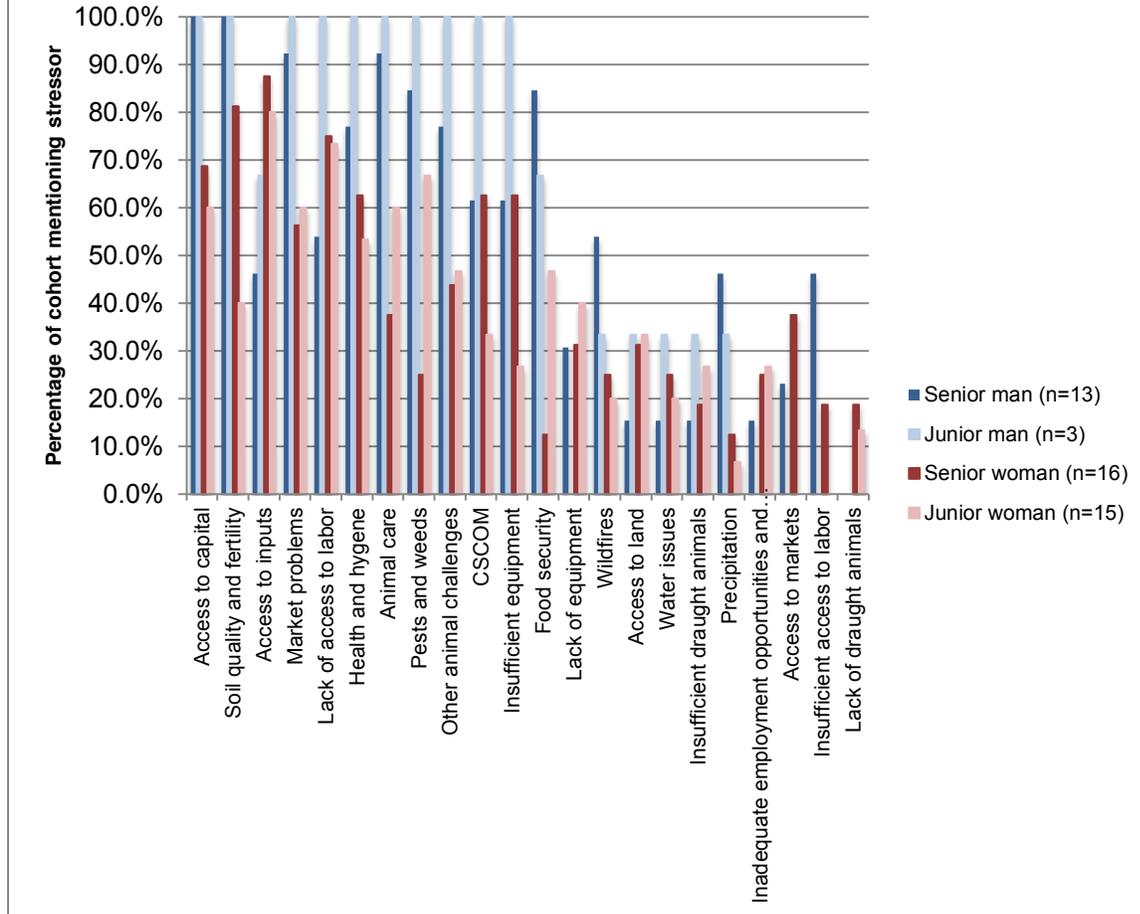
Women in this group expressed the highest levels of concern for access to equipment and precipitation. These two factors fit together as parts of a whole, as both speak to the timing of women's agricultural production. The lack of access to animals limits the ability of women to prepare and cultivate fields, and the delays they experience in starting these activities make the duration of the season and the total amount of rainfall critical factors that shape their agricultural outcomes. Of junior and senior women in households with adequate equipment, labor, and animals, only one (the senior woman in Interview #46) reported making her own agricultural decisions. Of the crops that have advisories, this woman only cultivated peanuts and cotton. All of her other decisions fall outside the information provided by advisories. Interestingly, she was not using the advisories, or even the local indicators like trees and birds mentioned by junior and senior men in this group. Instead, for peanuts and other rain-fed crops she relied exclusively on the calendar, preparing to plant by the 7<sup>th</sup> lunar month. For cotton, she claimed to compare the traditional calendar and the information about when to sow from the cotton cooperative to

compare two sources of information and make a good decision. However, neither source is an advisory from Meteo Mali. Further, later in the interview, this same woman claimed that livelihoods resource and agricultural decisions were in fact made by her husband, as he is the head of the household. In short, these women are not using the advisories because they generally do not have the authority to make advisory-informed decisions, and when they do have that authority they do not appear to turn to the advisories for help.

The relative security of those in this group may also explain why a much greater percentage of the High Livelihoods Resource group expressed concern for health issues and the functioning of the local clinic (*Centre de Santé Communautaire*, or CSCOM) relative to any other group. With concerns like access to animals and equipment, food security, and income out of the way, and with resources to afford medical care, the members of this group are able to focus on these concerns in a manner not possible for the other groups.

In the **Limited Livelihoods Resource Group** (Figure 5.3.26), food security is not among the most commonly-reported challenges in the community, suggesting that those expressing this concern, especially men, are talking about fulfilling their roles, rather than averting real crises. Overall, it appears that junior men have the equipment and animals they need to conduct basic agricultural activities, while senior men have equipment but rely more heavily on manual labor to accomplish agricultural tasks. As a result, they are producing enough food to feed their families and households year-to-year. Both senior and junior men who mentioned food shortages as a problem never listed this as one of the first three challenges they named, and only raised it when the interviewer probed them for “other problems in your daily life.” The same was true for junior and senior women. The roles men and women, and those of greater seniority, play shaped the meaning of this response. Ten senior men (77.0%) and two junior men (66.6%) mentioned food shortage as a problem. Only three senior women (6.3%) and one junior woman (6.7%) mentioned food shortage at all. As men control much of the agricultural labor and production of these households, it is unlikely that men and women are experiencing radically different food outcomes. Instead, this difference reflects men’s need to feed their household as a key part of their role.

## Batimakana: Limited Livelihoods Resources Assemblages of Vulnerability



**Figure 5.3.26: Assemblages of vulnerability by seniority and gender in the Limited Livelihoods Resources group in 2014.**

Typically, senior men have ability need to mobilize labor (at least for family fields) than junior men, and therefore senior men tend to be less concerned about a lack of labor, and more concerned with adequate labor to meet the food security needs of the household. This pattern holds in The Limited Livelihoods Resource group. Senior men in this group have the authority they need to follow advisories. However, their ability to respond to advisories is limited. They cannot prepare all of their fields quickly, and cannot cultivate all of their fields simultaneously. Therefore, they are able to apply advisories to the crops they prioritize, such as sorghum. It is less likely they will be able to use advisories for crops like maize and millet, as these are generally given lower priority and therefore will be planted later in the season. Senior men in this group currently rely on traditional knowledge, such as the appearance of birds like storks (Interviews #11, #15, #27, #55), the flowering of specific trees such as shea, tomi, dougoura, oulougoura, balazau, nere (Interviews #11, #13, #15, #19, #21, #25, #27, #29, #61, #63, #69), and the traditional agricultural calendar which suggests planting in the seventh lunar month of the year (Interviews #19, #21, #25, #29, #61, #63, and #69) to time the preparation of their fields. Most of

these men used forecast data, usually from the radio, to decide when to sow, and one man (Interview #85) relied completely on agromet advisories to decide when to prepare and sow his fields. Therefore, these men largely see forecast information as useful and legitimate. Their ability to follow advisories, which speak to the cycle length of particular varieties, however, will be limited by the restrictions they face on what they can plant, and how much, in a timely manner.

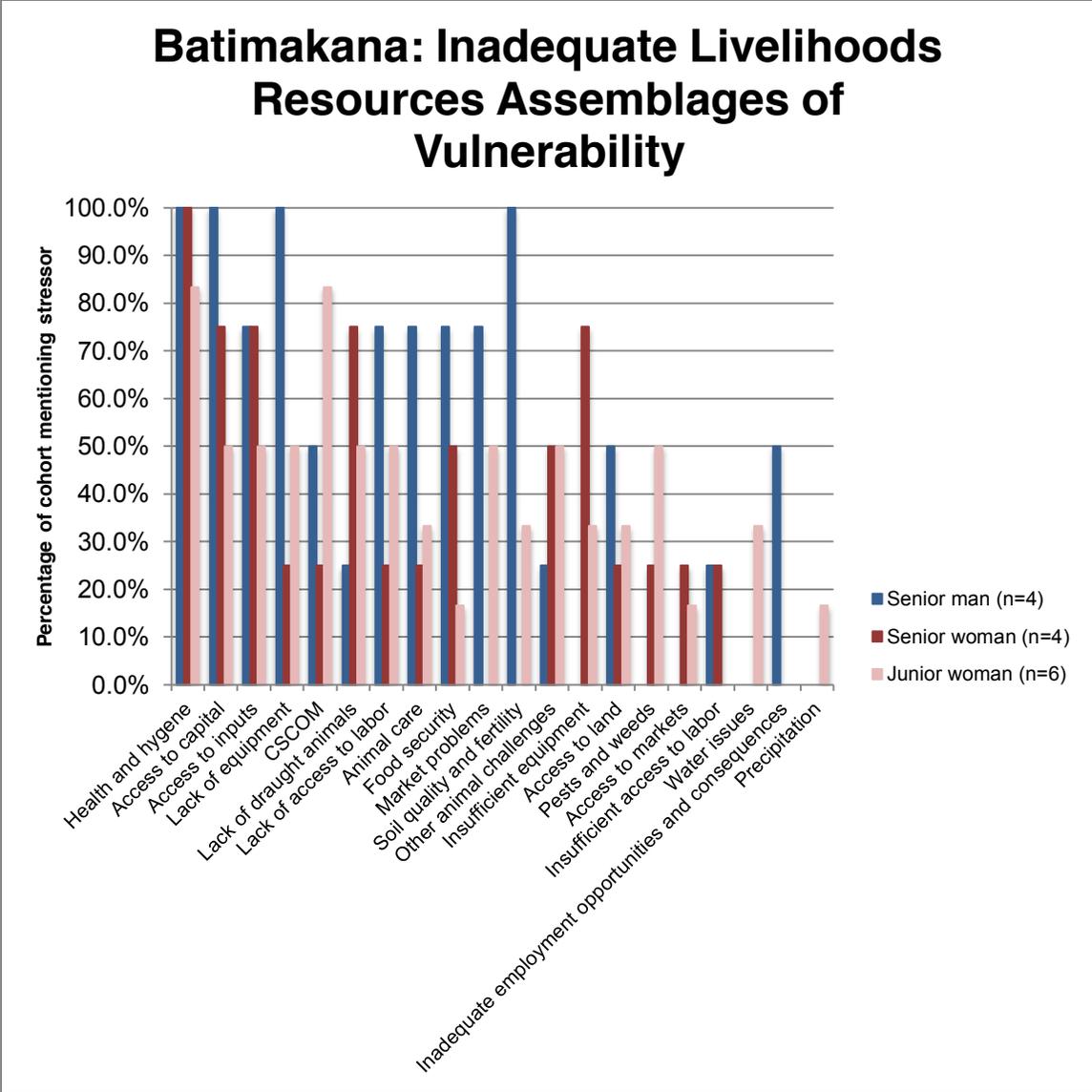
While they were less concerned about food security outcomes than senior men, in nearly every other respect the three junior men in The Limited Livelihoods Resource group express patterns of vulnerability that more closely resemble what we would expect from senior men (and specifically what we see from senior men in The High Livelihoods Resource group). For example, more junior men are concerned about inadequate access to agricultural equipment than senior men, while only senior men (and only a few senior men) report a concern for lack of equipment. Men only report a concern for insufficient animals, suggesting that they can use the donkeys and mules they own, along with a very limited number of draught cattle, to provide the basic traction they need. A greater percentage of men than women are concerned about health and hygiene, with junior men more likely to be concerned about these issues than senior men. Reporting this challenge frequently is another indicator of other, more basic needs being met.

Junior men in this group could benefit greatly from the use of timely, accurate advisories, as these might allow them to use scarce inputs more efficiently, and select crops and varieties that will provide the greatest return on the limited areas they are able to cultivate. However, they lack the authority to follow such advisories unless the senior men in their households, or in their families, are following advisories. In this regard, it appears that senior men in this situation do see forecast information as legitimate and credible, presenting an opportunity to filter advisory information to junior men through senior men if the latter are able to act upon the advisories. Further, with limited access to animals, equipment, and labor, they can respond to advisories, but they will not be able to prepare a large number of fields quickly. Therefore, they will be forced to prioritize crops (likely sorghum), and use the advisories for those crops while waiting to plant others (if they are planted at all) until the advisories are no longer useful. Only two of these men mentioned the information they used to make decisions. One, like many senior men, relied on the ripening of shea and tomi fruits to time the preparation of his fields (Interview #17), while using forecast information from the radio to time his sowing. The other relied on his father for advice on the preparation of fields, but compared these suggestions with forecast data from the radio to come to final decisions about the timing of his activities (Interview #53). Until such time as senior men in these households and families can act upon a wider range of advisories, it is unlikely that junior men will be able to use them widely, even if they were to acquire adequate equipment, animals, and labor.

The assemblages of vulnerability for junior and senior women are very similar, and reflect the fact that while they live in food secure households, they face the same constraints when making agricultural decisions. Aside from concerns over access to animals and equipment which reflect their need to wait until men have finished preparing and planting their fields, these women are concerned with lack of access to inputs and labor. They are seeking to ensure their food security, but many of these women would like to cultivate marketable surpluses as well. Their ability to use advisories to this end is limited. For crops such as peanuts, for which there are advisories, women have very little decision-making authority. For these crops, men tend to make the decisions about what to plant and when. As the men in this group do, on the whole, appear to view forecast data as legitimate and credible, and seem to use such data in their own decision-making, it is likely that this information indirectly informs women's agricultural practices. However, those women in this group who reported making agricultural decisions about when to prepare fields and when to sow mentioned some combination of the use of the traditional calendar (Interviews #04, #33, #35, #45, #50, #60, #64, #66, #83, #84), the appearance of rain (Interviews #28, #80), advice from their husbands (Interviews #32, #33, #35, #37, #39, #49, #51, #67,

#73), and the ripening of trees such as shea, nere, nevè, toîni (Interviews #35, #39, #45, #49, #67, #73, #79, #83). One junior woman (Interview #75) mentioned consulting with her mother-in-law for such information. The heavy reliance on husbands and men for information and advice on when to plant suggests that for these women to employ advisories, they will likely have to do so through their husbands – or advisories for “women’s crops” will have to be produced.

The **Inadequate Livelihoods Resource group** is a very stressed set of individuals (Figure 5.3.27). They have the lowest access to NFE of any group in Batimakana, and have very low levels of access to equipment and draught animals to facilitate farming. As a result, they are highly constrained in the size of their farms, the types and number of crops they can cultivate, and their ability to produce for market and thereby build up household and family assets. Senior men and junior women are clearly looking for ways to increase their production, while senior women seem more interested in consolidating their subsistence production.



**Figure 5.3.27: Assemblages of vulnerability by seniority and gender in the Inadequate Livelihoods Resources group in 2014.**

When we look at the assemblages of vulnerability associated with different gender/seniority cohorts in The Inadequate Livelihoods Resource group, we find that senior men are deeply concerned with access to capital, an absence of farming equipment, lack of access to labor (and only a single man reported concerns for insufficient labor, suggesting most men have deep labor needs due to the lack of animals and equipment, as opposed to desires to expand already-adequate production), and inadequate opportunities for NFE. At the same time, they are worried about food security, reflecting their role as the provider of food for the household and family. These men are greatly constrained in their ability to play their role as leaders and providers for the family and household. This reinforces the interpretation of their crop selections as ones that meet their role as providers first, and as cash income second. Their complaints about inadequate employment go along with their concerns for access to capital, both of which would enable the purchase of animals and equipment that would facilitate this role.

Senior men with inadequate access to livelihoods resources respond to advisories in a timely manner, as they must wait to borrow or rent agricultural assets after they have been used by other, better off individuals. This delays their field preparations and planting, shortening their agricultural season and reducing the value of advisories, especially those delivered early in the season. In this group, men rely on the fruit ripening on trees such as tomi, shea, dougara (Interviews #23, #65, #81), the appearance of birds such as storks (Interviews #23, #77, #81), and the traditional agricultural calendar that dictates the preparation of fields in the seventh lunar month (Interviews #23, #77) to determine when to prepare their fields. These men reported using forecast data to determine when to plant, and therefore see forecasts as salient and reliable. One senior man said he followed his brother's decisions about when to plant (Interview #81), along with using forecast data. This suggests that senior men in this group will use advisories, if they productively inform their specific agricultural situations. As these men are delayed in the start of their agricultural production, and likely very limited in their ability to cultivate large areas, they will likely view sorghum advisories as most useful, with some interest in peanut advisories (if the planting of peanuts occurs early enough to allow for decisions about cycle length), with less interest in millet, maize, or cotton advisories.

Senior women with inadequate access to livelihoods resources are, like other women in Batimakana, limited in their ability to make their own agricultural decisions. The only exceptions to this are widows. One woman (Interview #34) was a widow and made all of her own agricultural decisions. She reported using forecasts from the radio to inform her decisions. Two senior women (also widowed) (Interviews #26 and #90) referenced using men's calendars or the cotton calendar, for as #90 noted, the traditional calendar was no longer accurate and rain did not come in the seventh month. Thus, widows regain decision-making authority for their crops, but in this group they lack the animals, equipment, and labor necessary to capitalize on their own decisions. A married senior woman in this group (#78) said her husband gave the orders to sow, but then claimed she based this decision on rainfall measurements. It is not clear if she meant measurements from the rain gauge, or how this would be compatible with following her husband's orders. These women were growing peanuts, sorghum, and maize at rates comparable to senior men, likely because they had to meet their own grain requirements.

Junior women with inadequate access to livelihoods resources are highly constrained in their agricultural practice. They appear somewhat more concerned about access to labor and equipment than senior women, who are themselves more concerned with access to draught animals. It is possible that junior women are seeking more labor and equipment to push their surpluses higher and further greater market engagement. Greater access to draught animals might serve to help senior women do the same, or it might help them better meet the subsistence needs of the household. This difference is supported by junior women's concerns for market problems soil quality and fertility, water concerns (which affect their ability to irrigate), and concerns for precipitation, none of which are expressed by senior women. In short, junior women's assemblage of vulnerability appears more to be associated with individuals attempting to boost their agricultural production and market engagement, while senior women express concerns more directly related to subsistence production. Junior women in this group have little decision-making authority of their own, instead relying on or being told by their husbands what to plant (Interviews #41 and #47). The other junior woman in this group (Interview #44) claimed to make her own decisions about when to plant, based on the traditional calendar. She appeared to have control over her agricultural decisions, but her husband controlled access to money and animals, both of which limit the decisions a woman might make about her agricultural activities.

### **5.3.5. BATIMAKANA: EXPLAINING EXISTING ADVISORY USE**

The discussion above suggests the need to examine advisory use from the perspective of these vulnerability groups. When we examine the reported use of forecasts generally, and advisories more specifically, among the population of Batimakana, we find large differences in information by group

(Figure 5.3.28). More than 60% of those in the High Livelihoods Resource Group are using forecasts of some sort or another to inform their agricultural decisions, while nearly 20% of this group is using the advisories. The rates of forecast use drop off across the groups as access to livelihoods resources drops. Advisory use falls precipitously from the High Livelihoods Resource Group to the other groups.

Within these groups, the roles and responsibilities associated with particular intersections of gender and seniority also shaped advisory use. Critically, no women used the advisories, regardless of seniority or group. While 23.5% of senior men in the High Livelihoods Resource group appeared to be using the advisories, 16.7% of junior men in this group were using advisories. Only 7.7% of the senior men in the Limited Livelihoods Resource group were using advisories, but no junior men reported using them. While 25% of senior men in the Inadequate Livelihoods Resource group were using advisories, this figure represents one man out of four, and therefore might be over-representing advisory use (there were no junior men in the Inadequate Livelihoods Resource group).

	Using forecasts	Using advisories
<b>High Livelihoods Resource Group</b>	61.5%	19.2%
<b>Limited Livelihoods Resource Group</b>	45.9%	2.7%
<b>Inadequate Livelihoods Resource Group</b>	35.7%	7.1%

**Figure 5.3.28: Rates of advisory use by the different vulnerability groups in Batimakana.**

## 5.4. SAMAKELE/ZONE ML 09

Samakele is the seat of the rural commune of Ben Kadi in the Banamba Cercle of Mali's Koulikoro Region (Figure 5.4.1). Located 12.5km west of Banamba, and 100km north-northeast of Bamako, this was the only community with access to the advisories visited by the preliminary assessment in livelihoods zone ML 09, ““West and central rainfed millet/ sorghum”. The 2009 census of Mali records the population of Samakele as 1017 people (511 men and 506 women) (Republique du Mali, 2009). The community is divided into 55 concessions and 141 households. In Samakele there are an average of 2.6 households per concession, and 7.6 people per household.



**Figure 5.4.1: Locator map of Samakele, and Zone ML 09. This map represents the assessments interpretation of the boundaries of this zone, which conform to those of FEWS-NET (Dixon and Holt, 2010). Map credit: Christopher J. Witt, Department of Geography, University of South Carolina.**

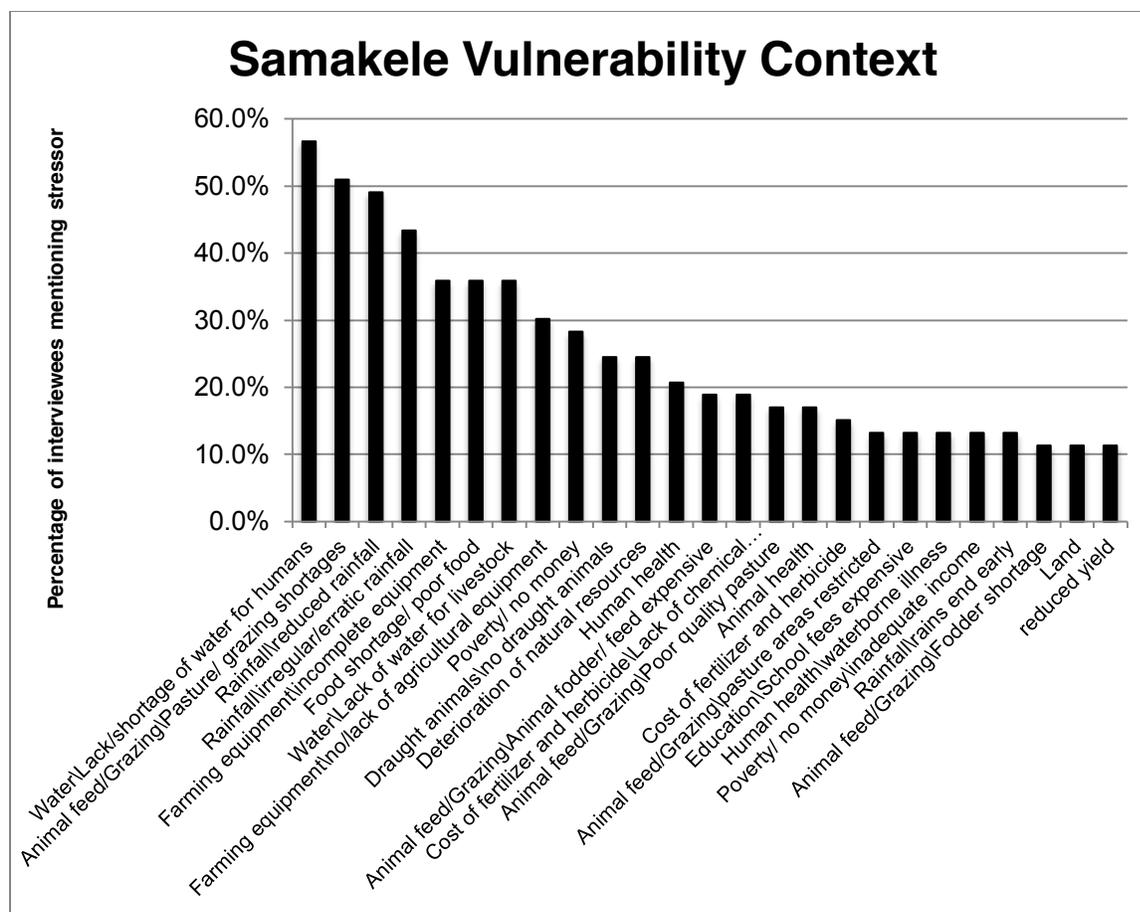
Samakele is located near the northern extent of the Sudanian zone in West Africa, and annual precipitation averages between 600mm and 800mm per year (Dixon and Holt, 2010, p.86). The bulk of rainfall occurs between late June and the end of August. Households and individuals in this zone experience a hungry season that runs from June to September. The experience of that season varies by household and individual, and is heavily predicated on wealth and agricultural production. Those with larger reserves of food, or with more financial assets with which to buy food and agricultural equipment, generally fare better during this season. Poorer households often have to take loans to purchase needed farm equipment and inputs, and then pay back those loans with proceeds from the harvest. Dixon and Holt (2010, p.91-92) list livestock theft, malaria, a lack of adequate pastureland for livestock, insufficient rainfall, crop-damaging pests, livestock diseases, flooding, and bushfires as major stressors in this zone. Figure 5.4.2 is a qualitative ranking, from most to least important, of the stressors mentioned by respondents in Samakele during the preliminary assessment of the Agrometeorological Advisory program. Samakele was the only village studied in this zone that was still participating in the program.

## Samakele

Most important ↓ Least important	Irregular/inadequate rainfall
	Lack of farming equipment
	Lack of good seeds
	Low access to land
	Lack of inputs
	Land cover and soil degradation
	Pests
	Animal health/vets
	Lack of animal fodder

**Figure 5.4.2: Vulnerability contexts of Zone ML09 and Samakele specifically, from the 2012 preliminary assessment.**

In 2014, investigations into the current vulnerability context produced a very similar list of concerns (Figure 5.4.3). High on both lists are concerns for adequate access to farming equipment, land cover and soil degradation, and changing rainfall patterns. The 2014 data shows a significant concern for water access that was absent in the 2012 data. However, the concern in 2012 for the lack of access to good seeds does not appear in 2014. These differences likely speak to the different ways in which this data was gathered, as concerns like inadequate seed access might be captured by concerns for changing land quality, rainfall, and declining yields. Overall, the vulnerability context of 2012 and that in 2014 appear consonant.



**Figure 5.4.3: The vulnerability context of Samakele, from the 2014 field data.**

The 2012 preliminary assessment of advisory use in Samakele, and zone ML 09 more broadly, found that while men demonstrated unusually high rates of use, there was a highly gendered pattern of use (Figure 5.4.4). This preliminary result suggested that, in this zone, advisories had much deeper penetration into agricultural practices and livelihoods than in other parts of southern Mali, though we cautioned that this result was derived from a single village and therefore could be an outlier (Carr, 2014a).

	Aware of program	Follow advice	% likely using
GLAM senior men	100.00%	80.00%	80.00%
GLAM senior women	100.00%	0.00%	0.00%
GLAM junior men	100.00%	80.00%	60.00%
GLAM junior women	100.00%	0.00%	0.00%

**Figure 5.4.4: Reported rates of advisory use in Zone ML09/Samakele from the 2012 assessment. Zone ML 09: "West and central rainfed millet/sorghum".**

The data collected in 2014 provides a more complex picture of advisory use, and one that is less rosy. Of the 46 residents who discussed the information they use to make agricultural and other livelihoods decisions with the field team, only two referenced amounts of rainfall in the previous 10 days as per the advisories. Only one man mentioned using forecasts at all. Even with the most generous interpretation of forecast use as advisory use, only 14.7% of the senior men interviewed were using the advisories. No junior men were using the advisories, though the small number of such men in this analysis may have missed a few that were using the advisories. No women of any seniority were using the advisories. In short, advisory use is substantially lower than initially indicated in the 2012 data, and even lower than the patterns and levels of use seen in other villages in other livelihoods zones across southern Mali.

Just as advisory use is not uniform, so too the experience of the vulnerability context in Samakele is not uniform. Different members of the community have different levels of access to livelihoods resources, play different roles, and experience different expectations for their work and behavior that shape their exposure, sensitivity, and adaptive capacity in the face of different stressors. In 2012, these differences were addressed by stratifying the sample by gender and seniority. In 2014, the more nuanced LIG approach allowed the field team to identify three different groups in the village that were experiencing different vulnerabilities (Figure 5.4.5).

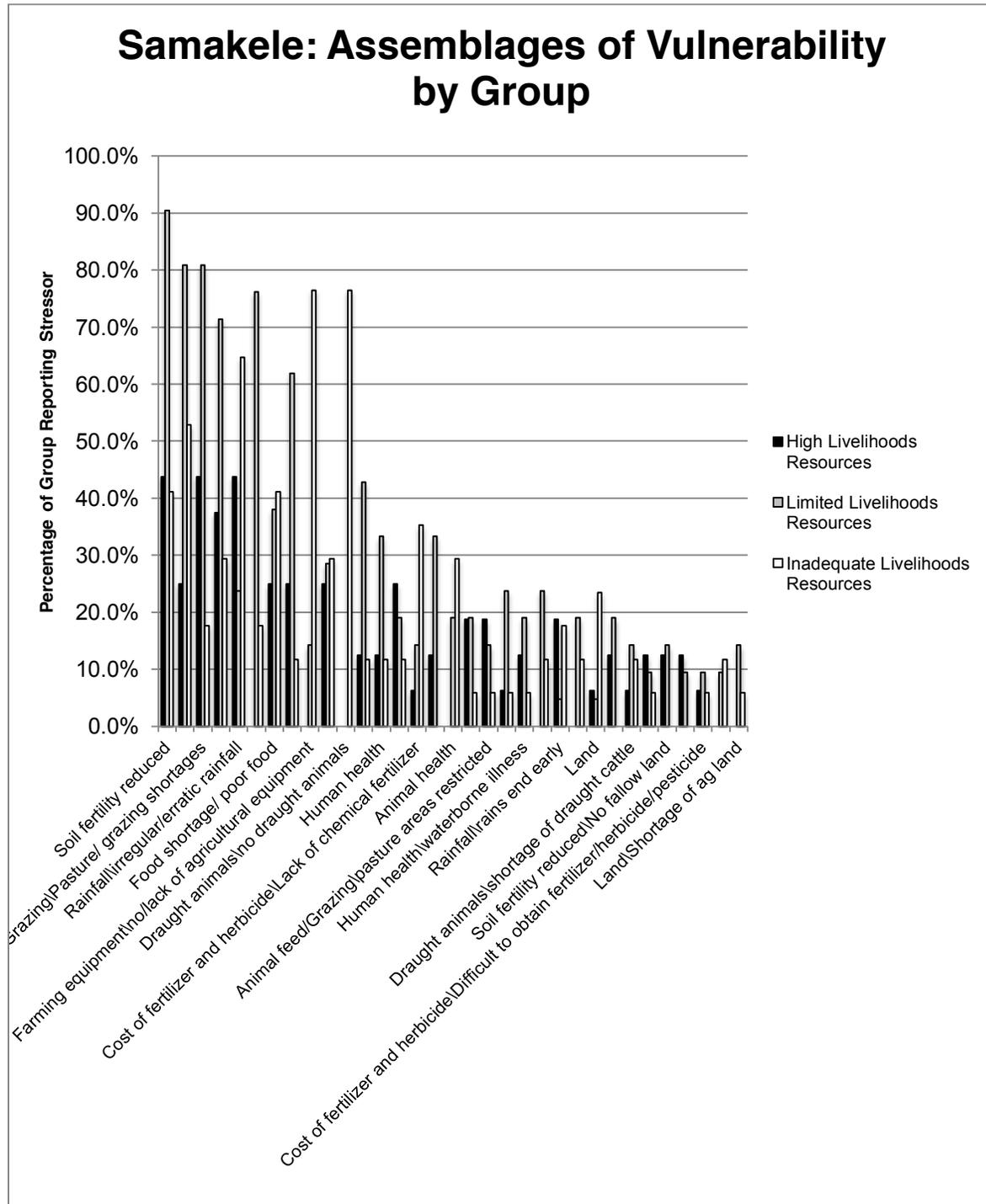
Group 1, the **High Livelihoods Resources** group, has very high levels of access to agricultural equipment, often owning all or nearly all of the equipment they need. They tend to have excellent land access, usually through inheritance, can afford to use chemical fertilizers, have access to farm labor, and own drought cattle. As a result, members of this group have a great deal of agricultural capacity. Their most-reported concerns are for declining soil fertility, adequate pastureland for their animals, and erratic and reduced rainfall. It is important to note, however, that less than half of this group reported experiencing any particular concern, suggesting that the secure livelihoods base of the group allows for the consideration of more diverse, idiosyncratic concerns.

Members of The Limited Livelihoods Resource group, the **Limited Livelihoods Resources** group, generally have more constrained asset bases than seen in the High Livelihoods Resource Group. Members of this group are missing one or more pieces of equipment and/or must borrow or rent draught animals and/or cannot afford chemical fertilizers. Their agricultural efforts are therefore more constrained than those seen in Group 1. The Limited Livelihoods Resources group shares concerns for soil fertility, grazing shortages, and reduced rainfall with those in the High Livelihoods Resources group. However, these concerns are much more widely reported in the Limited Livelihoods Resources group, and also include concerns for access to adequate drinking water, adequate agricultural equipment, and adequate water for livestock. This group, more than the High Livelihoods Resources group, has concerns for raising the material resources they need to survive and thrive in this area.

In Group 3, the **Inadequate Livelihoods Resources** group, members have little or no access to draught animals, equipment, or adequate land. This group includes individuals who might otherwise be classified with the Limited Livelihoods Resources group, but whose access to land is so constrained they cannot produce adequate food for the year. Members of this group are principally concerned with a lack of (as opposed to inadequate) agricultural equipment and draught animals. More than 70% of this group reported these concerns. After these, the principal concerns are much like those in the Limited Livelihoods Resources group, including erratic rainfall, shortage of adequate drinking water, concerns for soil fertility, though of these only rainfall and drinking water are reported by half or more of the group. This group is deeply resource constrained, such that most of their vulnerabilities flow from the need to secure better access to livelihoods resources.

These are significant differences that greatly shape the utility of agrometeorological advisories across these groups. To understand the degree to which this is true, we must consider the roles and

responsibilities associated with different members of these groups, and how these produce different patterns of vulnerability in Samakele.



**Figure 5.4.5: Assemblages of vulnerability for the three groups in Samakele described above.**

#### 5.4.1. IDENTITY IN SAMAKELE

Within each of the groups above, different members occupy different social roles with different responsibilities. These roles and responsibilities shape their ability to make agricultural and other livelihoods decisions, and therefore their ability to use the agrometeorological advisories. Principally, as in much of southern Mali among the Bambara (including those in Samakele) and closely affiliated ethnicities, decision-making is greatly shaped by one's gender and seniority. Communities and their associated agricultural lands are organized by concessions (in Bambara, *du*) held by an extended family. Within these extended families, there are (often polygamous) households with associated agricultural fields (*gua* in Bambara). The oldest man in the family is the head of the concession, and makes broad decisions about agricultural and other livelihoods strategy for the family. His authority is strongest over the concession land and animals. The male head of a household largely controls decisions over *gua* land, but often will defer to the head of the concession when making livelihoods decisions. Women generally do not have a great deal of authority or decision-making power at either the level of the *du* or the *gua*, though a particular successful woman might have some voice in *du*-level discussions of livelihoods strategy. The sample from Samakele is dominated by men, and by individuals who are fairly senior within their household, concession, and the community as a whole. As a result, it was challenging to fully tease out the structures of decision-making in Samakele from this sample, though interviews with the population helped to lay out the roles and responsibilities of individuals as they emerge at the intersection of gender and seniority.

In Samakele, senior men are expected to make decisions about livestock and animals, agricultural practice, and household resources/financial management. Every senior man interviewed in Samakele claimed to make all decisions about agricultural practice, animal husbandry, and household expenses. One senior man (Interview #29) elaborated, arguing that a good husband was wise, a good manager, and someone who takes complete charge of the family expenses. Senior men's decisions are critical to the food security and well-being of the household, and as one junior man noted (Interview #02), a good senior man and husband feeds his family well. A senior man (Interview #03) agreed, arguing a good husband was one who was capable of feeding the family. When men in general farm, and certainly when senior men farm, the goal is principally to provide food for the family. In Samakele, the expectation is that this food will last at least six to nine months after harvest. Another senior man (Interview #51) extended this discussion to the expectations of character associated with senior men, arguing that a good senior man was wise, upright, someone who brought people together, treated everyone with fairness, and someone who gave good advice that was heeded. At the same time, he is also expected to be a good husband, one who, according to another senior man (Interview #46), is considerate of his wife, and provides her with both food and love.

Junior men have similar responsibilities, but they play out in the context of a social structure where the oldest member of the household has ultimate decision-making authority over the livelihoods activities of everyone in the concession. These men are expected to be fair to everyone in their households, but at the same time to respect their parents and the senior men in their family. It is telling that questions about the roles and responsibilities of junior men were often answered by the residents in terms of expectations associated with boys. Thus, junior men are expected to respect their parents, especially any orders or directions given by their parents (senior man in Interview #42). A senior woman (Interview #16) broadened this somewhat, noting that junior men were expected to obey their superiors, and work well in the family and family fields. Therefore, while junior men share responsibility for raising food, specifically grain, for their family with senior men, they are subject to senior men's decisions about livelihoods practice, including agricultural activities. Men who are significantly more junior and do not yet have their own families will meet the responsibilities attached to their role, but at the same time they are also likely to try to raise the money and resources necessary to be seen as a legitimate husband by the family of potential brides.

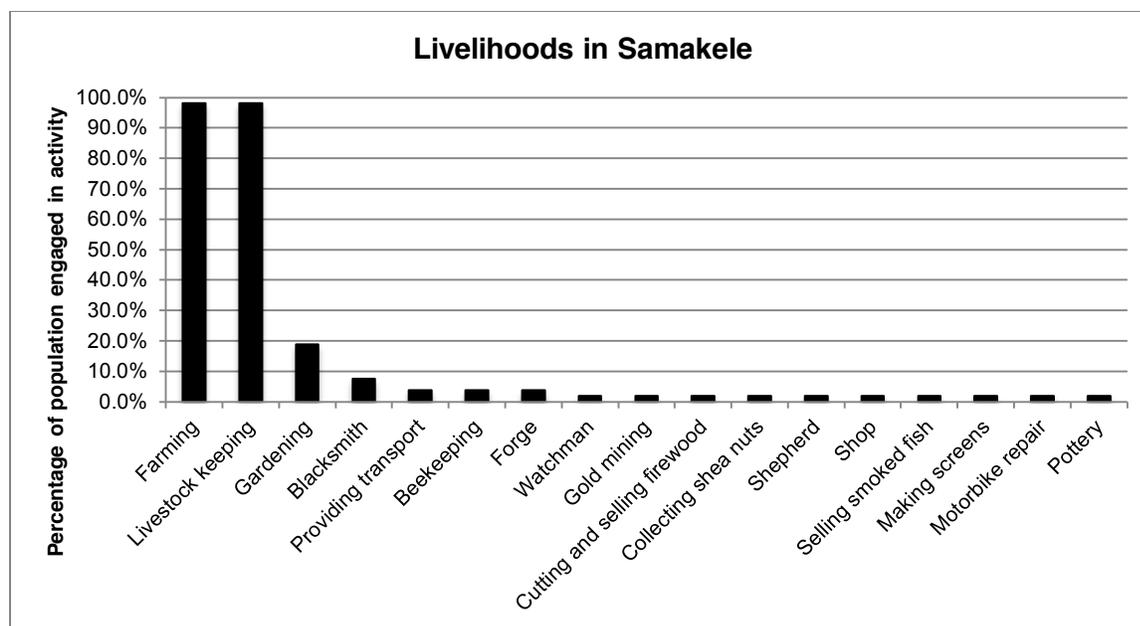
In Samakele, the single most commonly-mentioned characteristic of a good woman and wife is a good cook. Women are also expected to be respectful of their husbands, to be welcoming, to be fair to everyone in the family, and to be hardworking. The importance of obedience to authority is a very large part of the identity of a woman, as being submissive to her husband (this was noted independent of being respectful above), listening to her husband, and being respectful are other often-mentioned characteristics of “good” women in Samakele. Women, however, have specific responsibilities vis a vis food security. Women expressly stated that they did not cultivate millet, sorghum, and fonio because, as one senior man (Interview #34) argued, women do not have the responsibility of feeding the household. Further, women in general argued that they should not have this responsibility. One senior woman (Interview #12) said she could not take on the burden of agricultural decisions because, as she said, “I am no leader.” Others simply argued that such decision-making was not the proper role of a woman in Samakele (for example, the senior women in Interviews #08 and #14, and the junior woman in Interview #50). Women cultivate garden crops, which are often expressly defined as women’s crops. These are used both for food and for sale at market, to raise funds needed in the household.

Senior women are expected to be wise, and to give advice. While much of this advice is aimed at junior women, one senior man (Interview #37) noted that a good senior woman would be listened to by the family in general. Senior women are expected to set a good example for junior women and the community (senior man in Interview #37) with regard to their behavior, and in so doing will be listened to and respected. A good senior woman also brings people, especially family members, together. As one senior man (Interview #27) argued, a good senior woman is an agent of cohesion in the family. Junior women have few specifically stated roles beyond those generally associated with good women, but they are expected to respect their parents and superiors.

In Samakele, and likely in the broader livelihoods zone to which this village belongs, senior men have the greatest capacity to make decisions that might be informed by climate services. They are expected to make agricultural and other livelihoods decisions for their families, including for the junior men in their families. Junior men are expected to respect those decisions, and work hard under the instruction and guidance of senior men. They have little independent capacity to make advisory-informed decisions, though they can use advisories as long as they do not contradict the guidance of senior men. Women are not responsible for the staple grains that provide the family with food security, and therefore appear to have little use for advisories that target those grains.

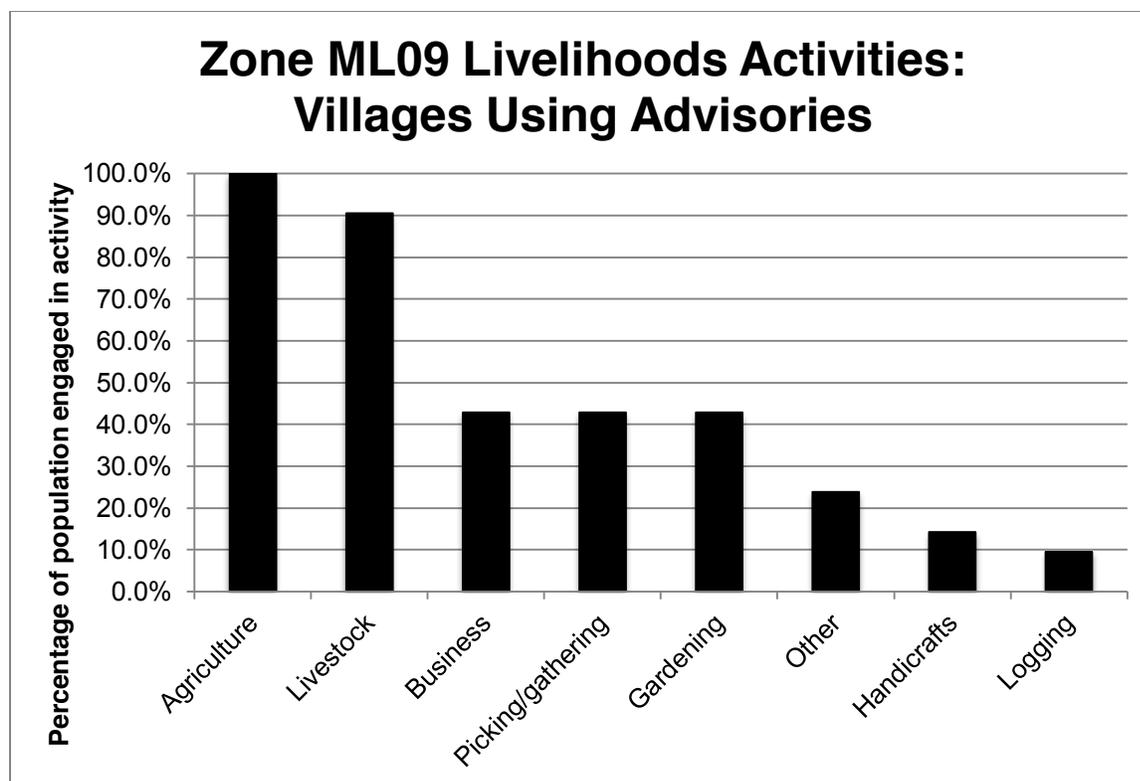
#### **5.4.2. LIVELIHOODS IN SAMAKELE**

Residents of Samakele engage in a relatively limited number of activities for their livelihoods (Figure 5.4.6). Nearly everyone in the sample farms and raises animals. Less than 20% of those sampled engage in gardening, with individuals or very small groups of individuals reporting all other activities. 32.1% of the sample reported some form of non-farm employment. The character of the sample in this village likely skews the picture of livelihoods presented below. Specifically, the rate of gardening suggested by this exercise is very likely underestimated, as gardening is widely seen as a woman’s activity in southern Mali.



**Figure 5.4.6: The livelihoods activities reported by residents of Samakele in 2014.**

Comparing reported livelihoods in 2012 and 2014 helps to assess the degree to which the 2014 results are distorted by sampling (Fig 5.4.7). It appears that the 2014 dataset above underreports gardening by half, and underreports small business participation and the gathering of shea nuts by even more. Both of these patterns are explained by the gender bias of the 2014 sample, as these are all activities heavily associated with women in the 2012 data. The rate of reported participation in other activities does not appear to be skewed significantly by the gender bias of the sample, simply because women engage in relatively few other activities, and like men engage heavily in agriculture and animal husbandry.

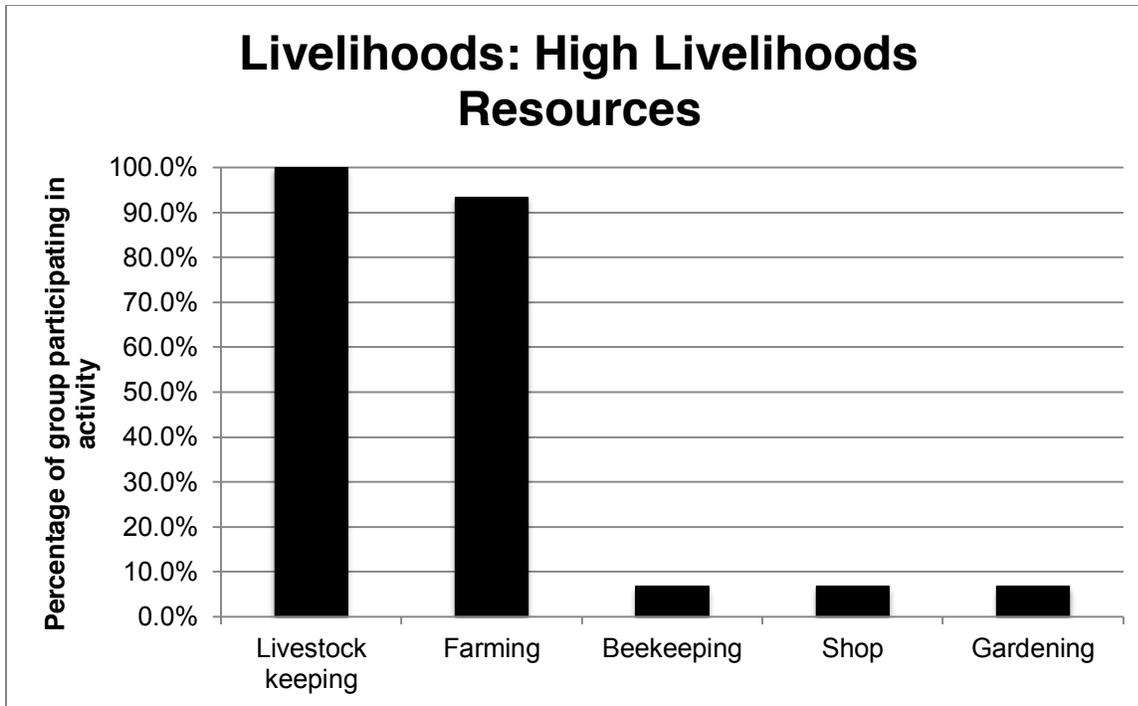


**Figure 5.4.7: The livelihoods activities reported by residents of Zone ML09 in 2012.**

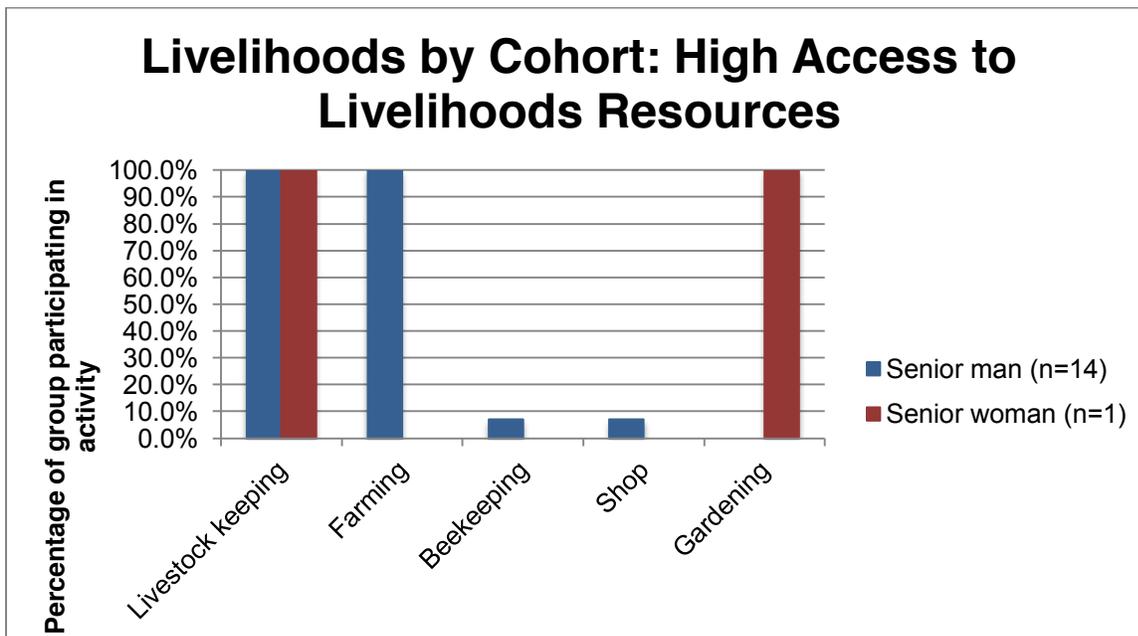
- 5.4.2.1 Those with High Livelihoods Resource Access

The sample of residents of Samakele with a high level of livelihoods resource access was comprised almost entirely of senior men. This is likely a product of the sampling issues during fieldwork in this village. Women’s reported rates of cultivation of sesame were much higher in the 2012 sample, suggesting that these women belonged to a group with a great deal of access to land and livelihoods resources, likely the high livelihoods resource group. This suggests the existence of a group of women farmers that were not sampled in 2014. However, in Bambara communities and households, men own and control most of the productive resources of the concession or household, and therefore they are the ones who are most likely to report adequate access to these resources. Even women in these concessions and households might experience less-than-adequate access to these livelihoods resources because their agricultural activities are of lower priority than men’s grain cultivation, and therefore women must wait until their husbands or sons provide animals, equipment, and labor before they can cultivate their own crops.

In this cohort, animal husbandry and agriculture dominate livelihoods (Figure 5.4.8). Only two individuals (14.3% of the group) reported non-farm employment. As there was only one senior woman in this group, it is difficult to meaningfully disaggregate the activities of different cohorts of gender and seniority in this group (Figure 5.4.9). It is worth noting that the senior woman in this cohort does not farm, concentrating her efforts on animal husbandry and gardening. She gardens during the rainy season, because in the dry season the wells for irrigation dries up. Therefore, she cannot farm as she dedicates her efforts to gardening for food.

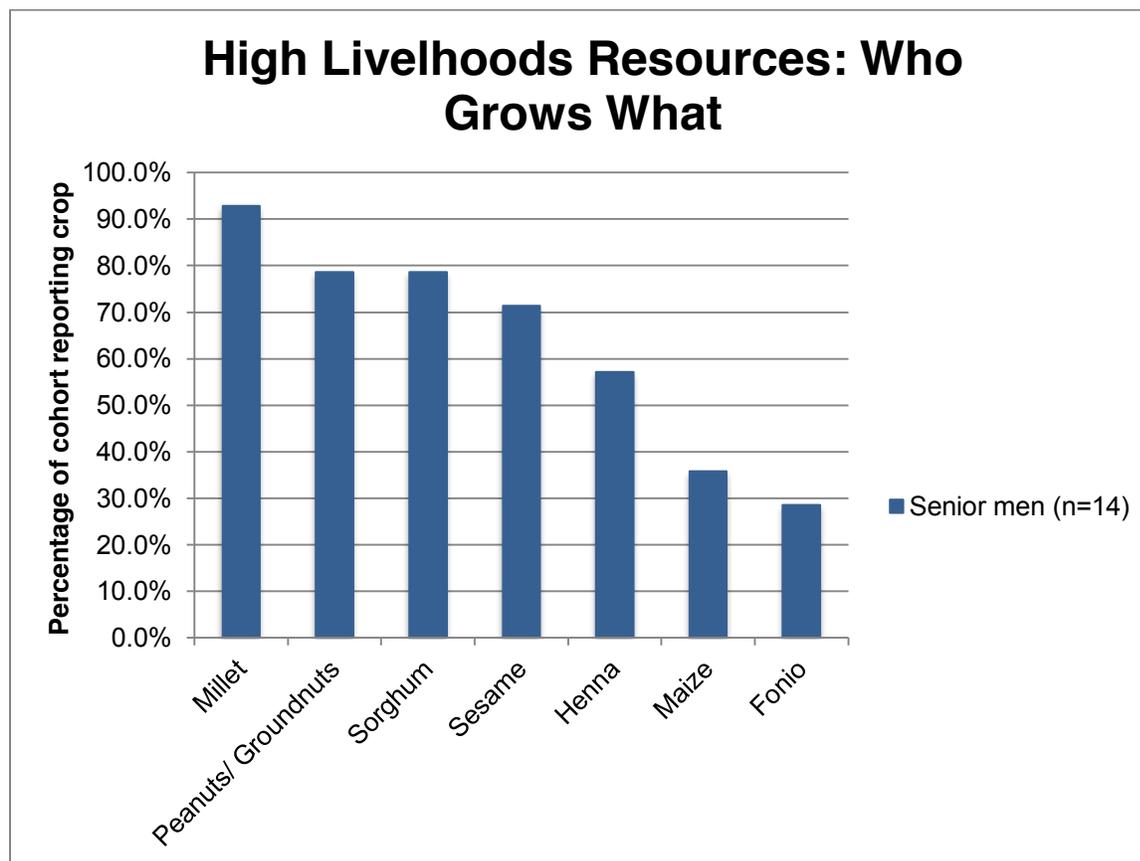


**Figure 5.4.8: Reported livelihoods activities of those with high livelihoods resource access.**



**Figure 5.4.9: Reported livelihoods activities of those with high livelihoods resource access, by gender/seniority cohorts.**

The field team in Samakele did not gather information on what crops the one woman in this group was gardening. They did gather information on the men in the group (Figure 5.4.10). These men most commonly cultivate three staple grains: millet, peanuts, and sorghum. These crops are cultivated as part of the food base of the concession and household (senior man in Interview #54). Men view agriculture as a zero-sum activity, where the addition of a new crop requires cutting back on the cultivation of others. Due to this fact of agriculture in Samakele, even the well-off cannot cultivate all of the crops they want. Somewhat fewer men cultivated sesame and henna, with very few cultivating maize or fonio. Those who are not cultivating henna disliked the idea of trading the cultivation of a staple crop for a cash crop (senior men in Interview #54 and Interview #36) and noted that as it is a perennial, you have to own land to cultivate it (senior man in Interview #54). Further, as another senior man (Interview #21) noted, henna takes three or four years to mature into a cultivatable crop, requiring other assets with which to make a living in the meantime. Interviews also suggested that most men will cultivate either sesame or henna, but not both as they need to cultivate some staple crops as well (senior man in Interview #46). Senior men (Interview #33, Interview #27, Interview #10, Interview #07) suggested that fonio and maize are not well-adapted to the agroecology around Samakele, and would often fail. More specifically, maize is not cultivated frequently because around Samakele it requires fertilizer, which is an expense that some cannot manage (senior men in Interview #46, Interview #32, Interview #28, Interview #27, Interview #10, Interview #07).



**Figure 5.4.10: The crop selections of those in the High Livelihoods Resource Access group in 2014.**

When we examine the uses to which these men put these crops, a sense of their agricultural strategy emerges (Figure 5.4.11). These men cultivate the three most common staple grains with the goal of providing subsistence for the household, per their familial and social responsibility. One senior man (Interview #07) referred to sorghum and peanuts as the basis of the family diet. Only in the case of peanuts do they expect a large enough harvest to have a marketable surplus, which is used to finance household needs (Interview #51). Several members of this group noted that peanuts are also useful because the peanut plant makes good animal fodder. These men are not highly focused on generating a marketable surplus of these crops, however, as they are cultivating sesame or henna as cash crops. The income from these crops is used to buy household needs such as fertilizer, to pay property and income taxes, to pay for medical care (see Interviews #07, #10, #20, #27, #33, #38, #46, #51, and #54), and, at least for one senior man (Interview #28), to finance the cooking and gardening of his wives. The few men cultivating maize and fonio do so to meet the subsistence needs of their concessions and households.

## Crop Use: High Livelihoods Resources

Millet				Peanuts			
	Avg	Interpreted value	n=		Avg	Interpreted value	n=
Senior men		1 Eat all	13	Senior men		2 Eat more than sell	11
Junior men				Junior men			
Senior women				Senior women			
Junior women				Junior women			

Sorghum				Sesame			
	Avg	Interpreted value	n=		Avg	Interpreted value	n=
Senior men	1.09	Eat all	11	Senior men		5 Sell all	10
Junior men				Junior men			
Senior women				Senior women			
Junior women				Junior women			

Henna				Maize			
	Avg	Interpreted value	n=		Avg	Interpreted value	n=
Senior men		5 Sell all	8	Senior men		1 Eat all	2
Junior men				Junior men			
Senior women				Senior women			
Junior women				Junior women			

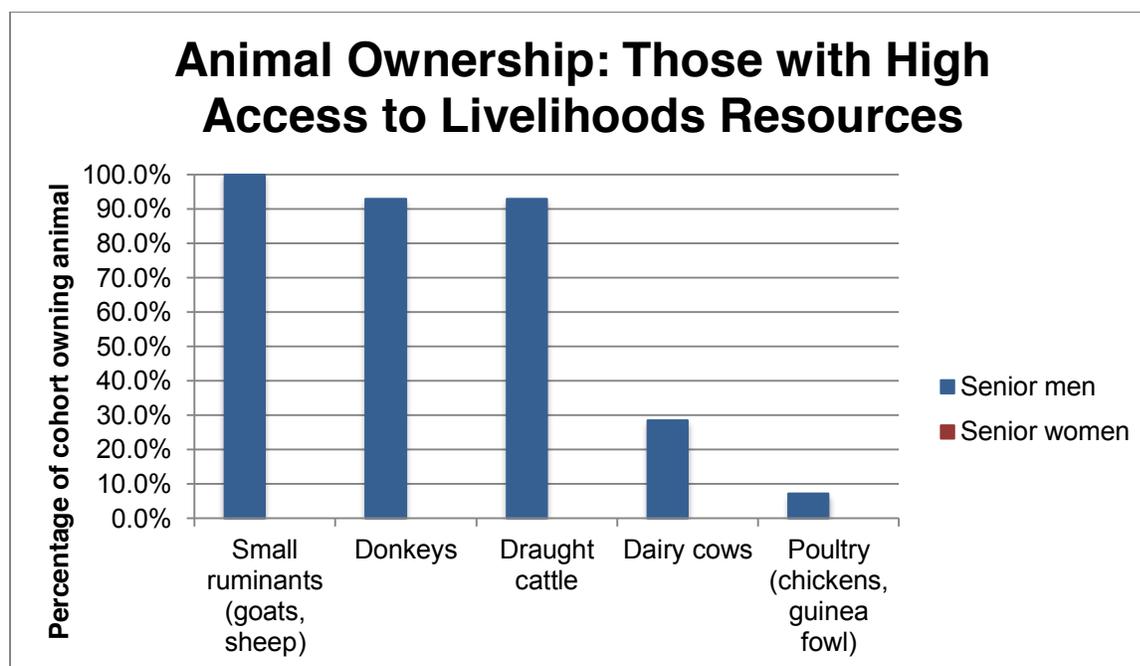
  

Fonio			
	Avg	Interpreted value	n=
Senior men		1 Eat all	2
Junior men			
Senior women			
Junior women			

**Figure 5.4.11: The uses for cultivated crops in the High Livelihoods Resource Group in 2014, divided by gender/seniority cohorts.**

With regard to variety selection, those in the High Livelihoods Resource group planted 90-day cycles of most staple grains. This includes maize, peanuts, and millet (though 30.8% of those farming millet hedged this by also planting 110-day cycle millet). They also planted 90-day cycles of sorghum, with only two senior men selecting 120-day cycles. Overall, the variety selection suggests a very conservative agricultural strategy, as those with the animals and equipment necessary to start farming as soon as the advisories are issued should have longer seasons with which to work.

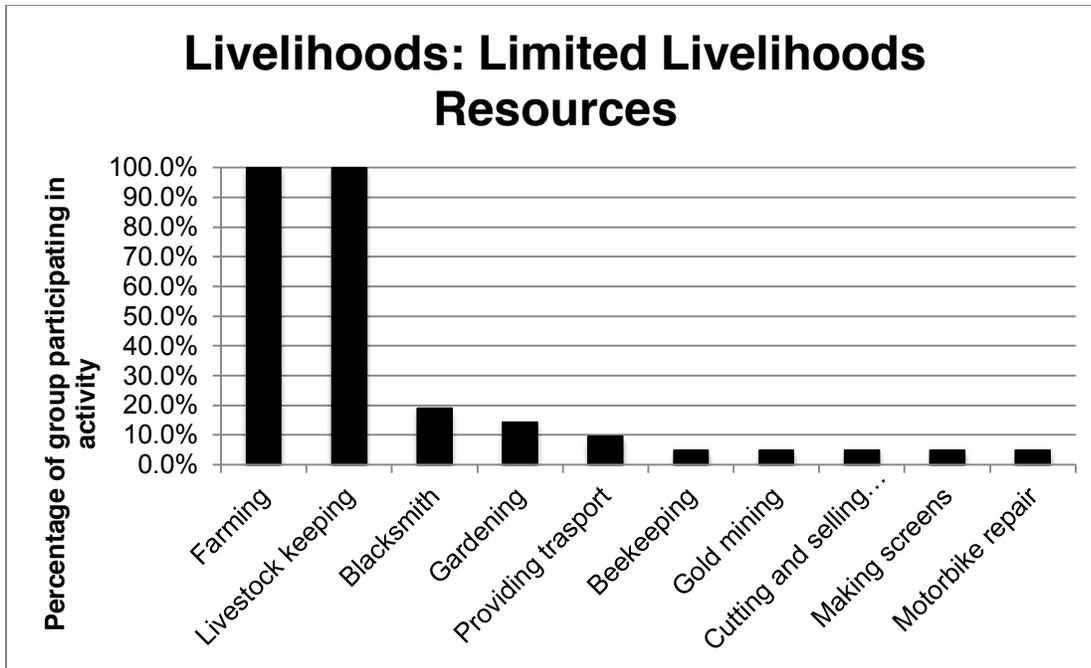
Not surprisingly, those in this group report high levels of animal ownership (Figure 5.4.12). Over 90% of the men in the group own draught cattle, which are critical sources of agricultural labor as well as stores of wealth. The same percentage own donkeys, which nearly all senior men said were used to pull the owner’s cart, and therefore used principally for transportation and a critical means of moving crops like sesame and henna to market. Small ruminants are used for savings, for sale for cash needs, for manure, and for the purposes of family or religious ceremonies. One senior man (Interview #46) captured the importance of this last role when he noted that he used his sheep for Tabaski (the fall feast commemorating the sacrifice of Abraham), weddings, and baptisms. This group has low levels of dairy cow and poultry ownership. The ownership of dairy cows appears to be a resource decision, as those in this group have draught cattle to look after. It is possible that the lack of interest in poultry reflects the fact that those in this group already own higher-value animals.



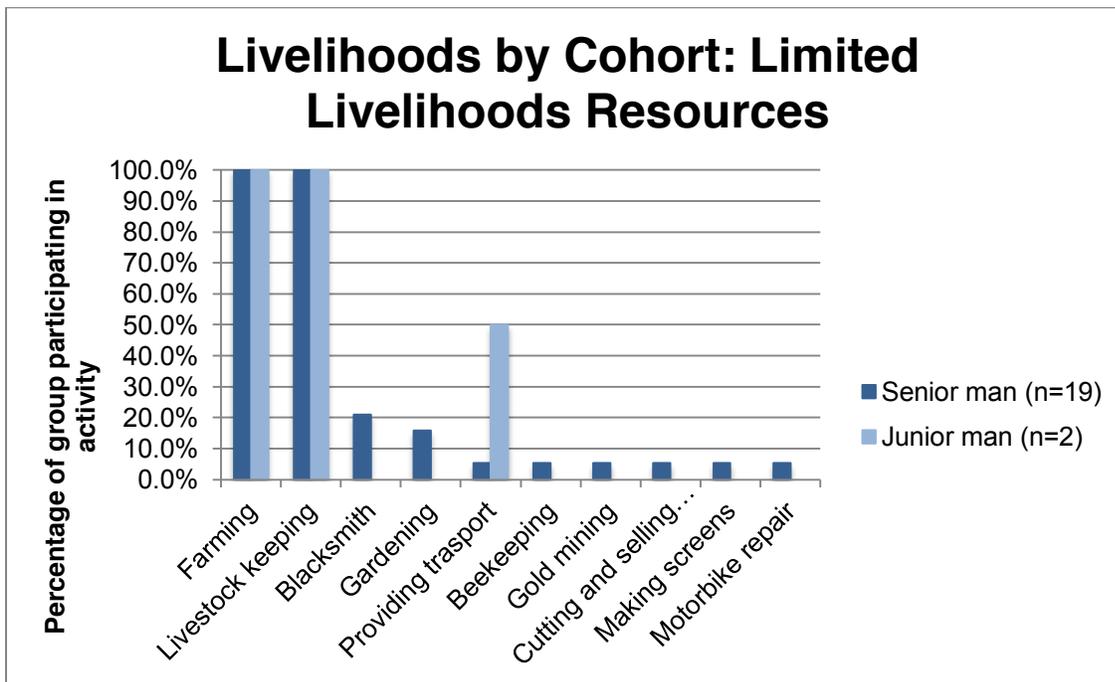
**Figure 5.4.12: The rates of animal ownership of members of the High Livelihoods Resource group in 2014.**

- 5.4.2.2 Those with Limited Livelihoods Resource Access

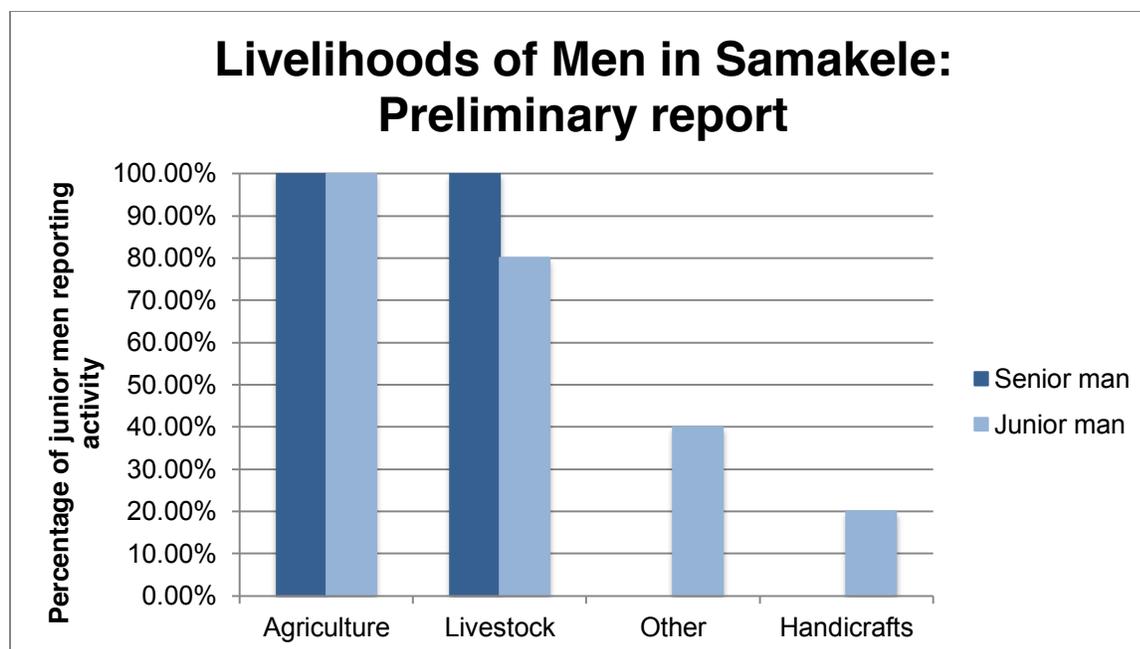
The group of residents with limited livelihoods resource access was comprised entirely of men, 19 senior and two junior. Members of this group focus on agriculture and animal husbandry for their livelihoods, though 42.9% of the group are engaged in some form of non-farm employment (Figure 5.4.13). The livelihoods of junior and senior men in this group are very similar (Figure 5.4.14) While there are only two junior men to examine, when we compare the 2014 data to the 2012 sample in Samakele (Figure 5.4.15), the distribution of livelihoods activities for junior men appears consistent. This suggests that the reported activities of the two junior men in this group are representative of wider views in the community.



**Figure 5.4.13: Reported livelihoods activities of those with limited livelihoods resource access.**



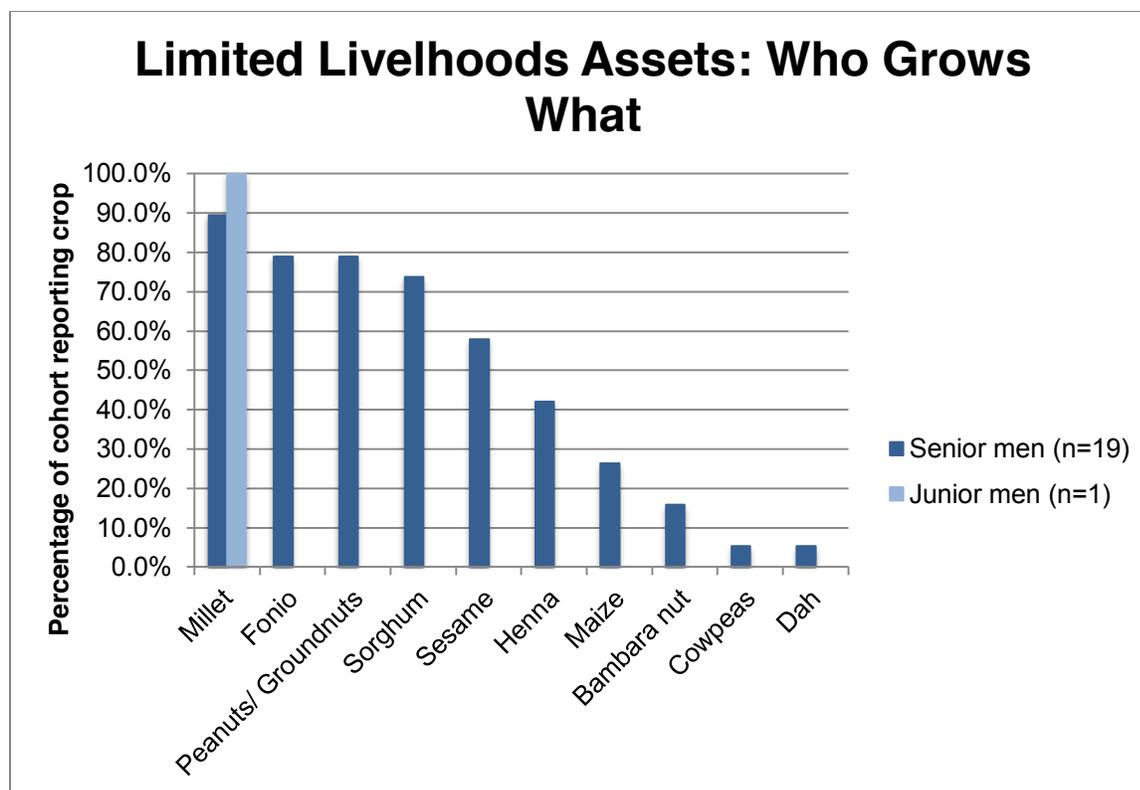
**Figure 5.4.14: Reported livelihoods activities of those with limited livelihoods resource access, by gender/seniority cohorts.**



**Figure 5.4.15: Reported livelihoods activities of men in Samakele in 2012.**

When we examine who is growing what crops, an unusual pattern emerges among junior men, who appear to be cultivating only millet (Figure 5.4.16). This pattern is explained by the fact that the field team did not gather crop information from one of the two men, and the fact the other focuses his livelihoods heavily on raising animals. The junior man for whom we do have crop information (Interview #02) noted that he did not cultivate maize because he did not have the means to purchase the needed fertilizer, suggesting that local agroecology is a barrier to the cultivation of this staple grain in Samakele. The millet this man cultivates is for feeding his family. Among senior men, fewer are cultivating the cash crops henna and sesame than in the High Livelihoods Resources group. As one senior man (Interview #03) noted, to grow sesame and henna requires land ownership. Cultivating these crops on loaned or rented land will cause the owner to take the land back (see also the senior men in Interviews #17 and #29). These cash crops are important to the men of this group, as 70% of them are cultivating either henna or sesame. However, only 25% of these men were cultivating *both* sesame and henna (compared to 50% of the men with High Livelihoods Resources), suggesting that, like access to draught animals and agricultural equipment, access to land and landholding is more constrained in the Limited Livelihoods Assets group.

Men in this group noted that maize was a fragile crop, requiring high soil fertility and a lot of rainfall spread over the growing cycle (senior man in Interview #31) to succeed. Neither is readily available in Samakele. Many of these men felt that overcoming these limitations required the use of chemical fertilizers they could not afford. Fonio cultivation appears to be heavily predicated on the availability of seed in the village. Those who have access to seed will cultivate it, but otherwise men will focus on other staple grains. This runs counter to suggestions of those with High Livelihoods Resources, who argued that fonio was not well-adapted to the agroecology of Samakele. One member of this group suggested that efforts to cultivate Bambara nuts would result in failure, as the season is too short to allow for their cultivation (senior man in Interview #03).



**Figure 5.4.16: The crop selections of those in the Limited Livelihoods Resource Access group in 2014.**

Members of the Limited Resource Access group largely share the uses of crops with those in the High Livelihoods Resource group (Figure 5.4.17). Staple grains, including millet, fonio, sorghum, and maize are cultivated for subsistence (senior men in Interviews #11, #02), for as one senior man (Interview #02) said of millet, “It is my food base.” Peanuts are also cultivated for subsistence, but with some expectation of a marketable surplus. One senior man (Interview #26) said that he used any income from these crops to pay taxes. It is important to note that members of this group noted that the stalks and leaves of the peanut plant made good fodder for their animals, providing another incentive to cultivate this crop. Sesame and henna are cash crops, used to pay for fertilizer, medical costs, and family responsibilities like weddings (senior men in Interviews #04 and #11, junior man in Interview #02). Cowpeas, bambara nuts, and dah are grown for consumption, and appear to be cultivated to meet the personal preferences of the farmer.

## Crop Use: Limited Livelihoods Resources

Millet	Avg	Interpreted value	n=
Senior men	1	Eat all	17
Junior men	1	Eat all	1
Senior women			
Junior women			

Sorghum	Avg	Interpreted value	n=
Senior men	1	Eat all	14
Junior men			
Senior women			
Junior women			

Sesame	Avg	Interpreted value	n=
Senior men	5	Sell all	11
Junior men			
Senior women			
Junior women			

Maize	Avg	Interpreted value	n=
Senior men	1	Eat all	4
Junior men			
Senior women			
Junior women			

Cowpeas	Avg	Interpreted value	n=
Senior men	1	Eat all	1
Junior men			
Senior women			
Junior women			

Fonio	Avg	Interpreted value	n=
Senior men	1	Eat all	14
Junior men			
Senior women			
Junior women			

Peanuts	Avg	Interpreted value	n=
Senior men	1.67	Eat more than sell	12
Junior men			
Senior women			
Junior women			

Henna	Avg	Interpreted value	n=
Senior men	5	Sell all	8
Junior men			
Senior women			
Junior women			

Bambara nut	Avg	Interpreted value	n=
Senior men	1	Eat all	3
Junior men			
Senior women			
Junior women			

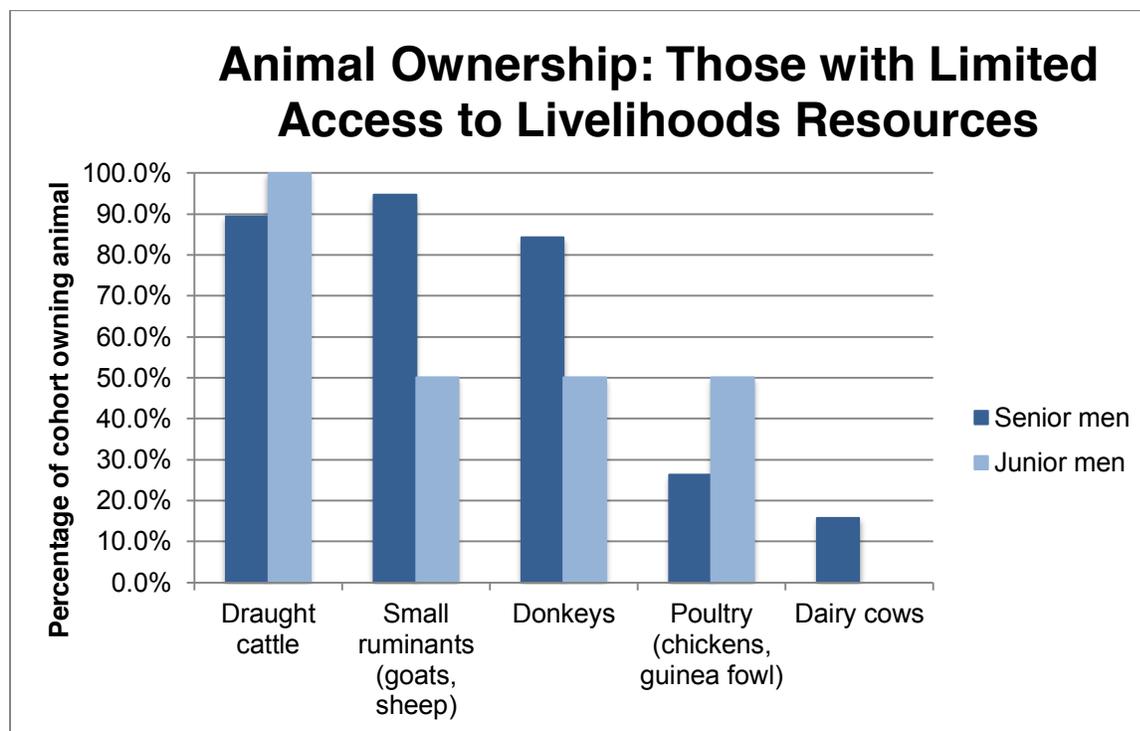
  

Dah	Avg	Interpreted value	n=
Senior men	1	Eat all	1
Junior men			
Senior women			
Junior women			

**Figure 5.4.17: The uses for cultivated crops in the High Livelihoods Resource Group in 2014, divided by gender/seniority cohorts.**

Variety selection among the Limited Livelihoods Resource group are very similar to those seen in the High Livelihoods Resource group. Both senior and junior men generally focused on 90-day cycles of staple grains such as millet, peanuts, and sorghum (though no junior men reported cultivating sorghum). However, senior men evenly split their selections of maize between 75- and 90-day cycles. As in the High Livelihoods Resource group, this appears to reflect a very conservative agricultural strategy that guards against short seasonal rainfall, though it is possible that these selections are also shaped by the fact that members of this group often have to delay the start of planting while they wait for animals and equipment.

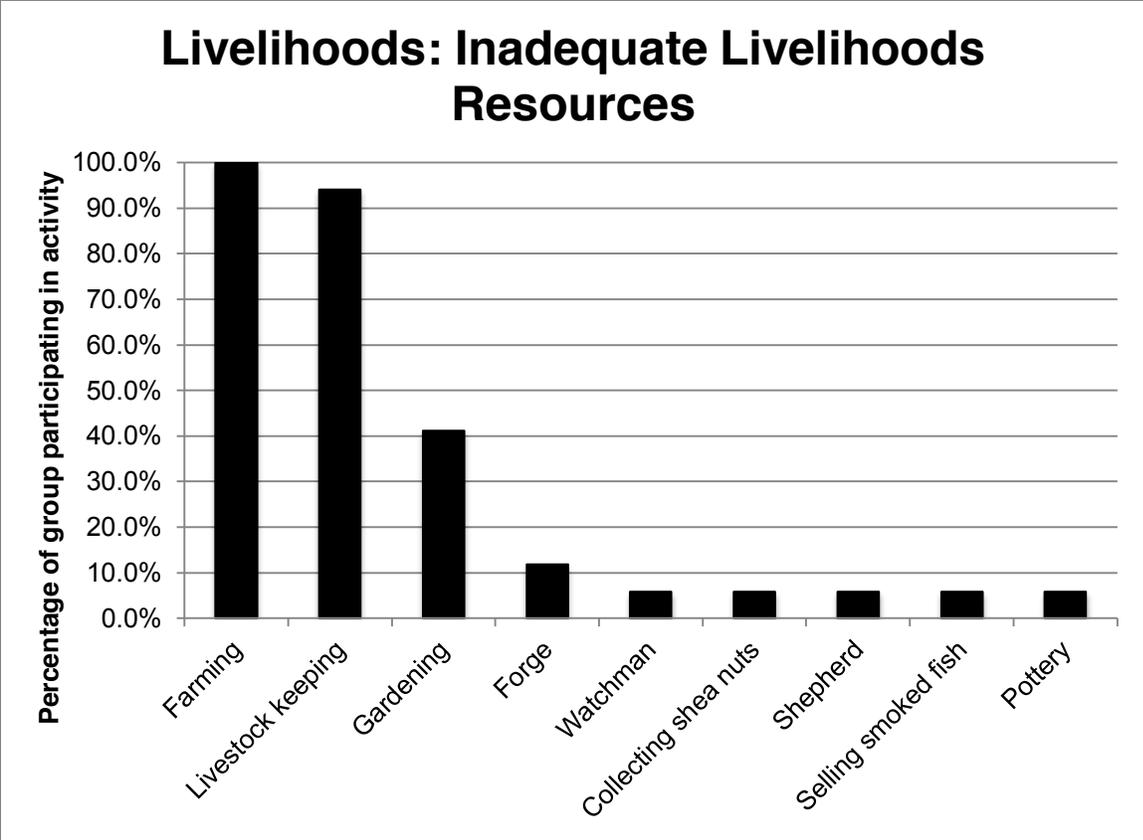
In this group, levels of animal ownership are very high, though somewhat lower than in the High Livelihoods Resource group (Figure 5.4.18). Members of this group have very high rates of draught cattle ownership which are principally used for farming, as well as small ruminants and donkeys. The rates of ownership for the latter two types of animal is lower than seen in the High Livelihoods Resource group, but not much lower. This group shows limited interest in dairy cows and poultry. In short, those with limited livelihoods resources appear to be accumulating, or attempting to accumulate, similar types of animals as those in the High Livelihoods Resource group. Their lower rates of ownership reflect a lack of capital with which to purchase the animals, not a different approach to the use of animals in their livelihoods.



**Figure 5.4.18: The rates of animal ownership of members of the Limited Livelihoods Resource group in 2014.**

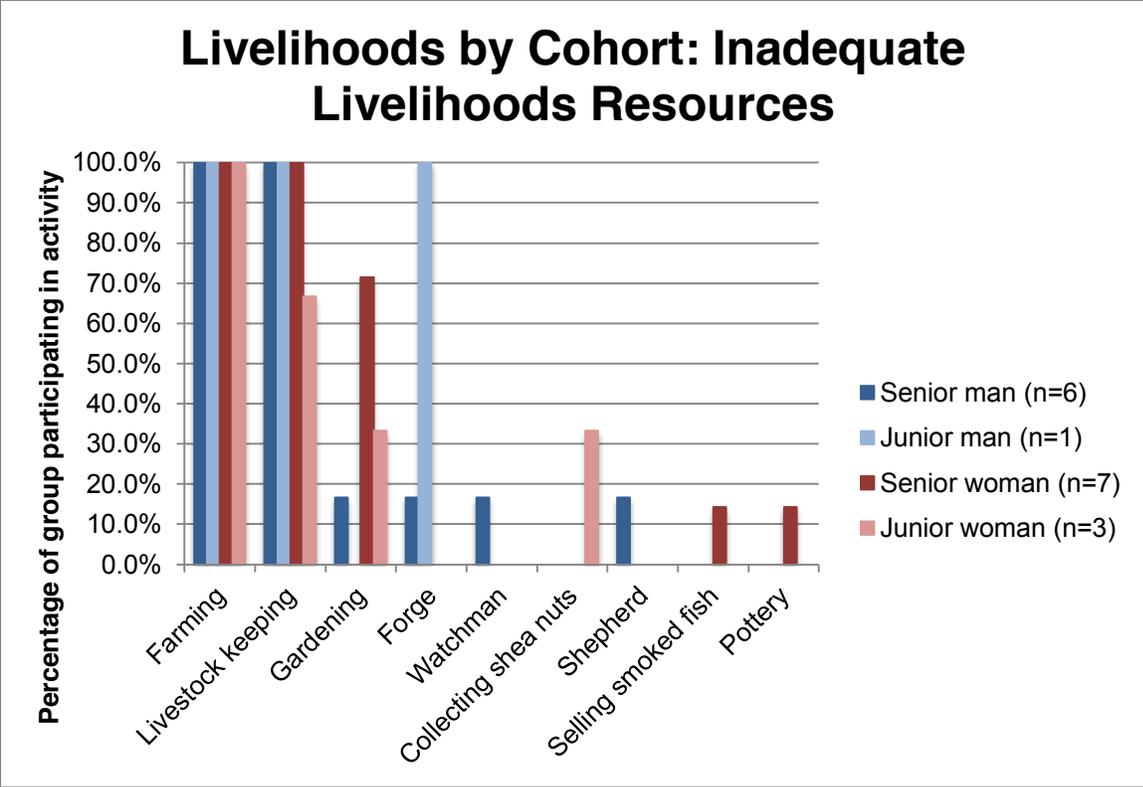
- 5.4.2.3 Those with Inadequate Livelihoods Resources

Those in Samakele with inadequate access to livelihoods resources comprise a diverse group, with all four seniority/gender cohorts represented. Junior men (n=1) and junior women (n=3) are lightly represented but present in the sample. As with the other groups in this village, members of the Inadequate Livelihoods Resource Access group focus their livelihoods activities on farming and animal husbandry, with gardening practiced by about 40% of the group (figure 5.4.19). Forty one percent of the group practices some form of nonfarm livelihoods activity.



**Figure 5.4.19: Reported livelihoods activities of those with limited livelihoods resource access.**

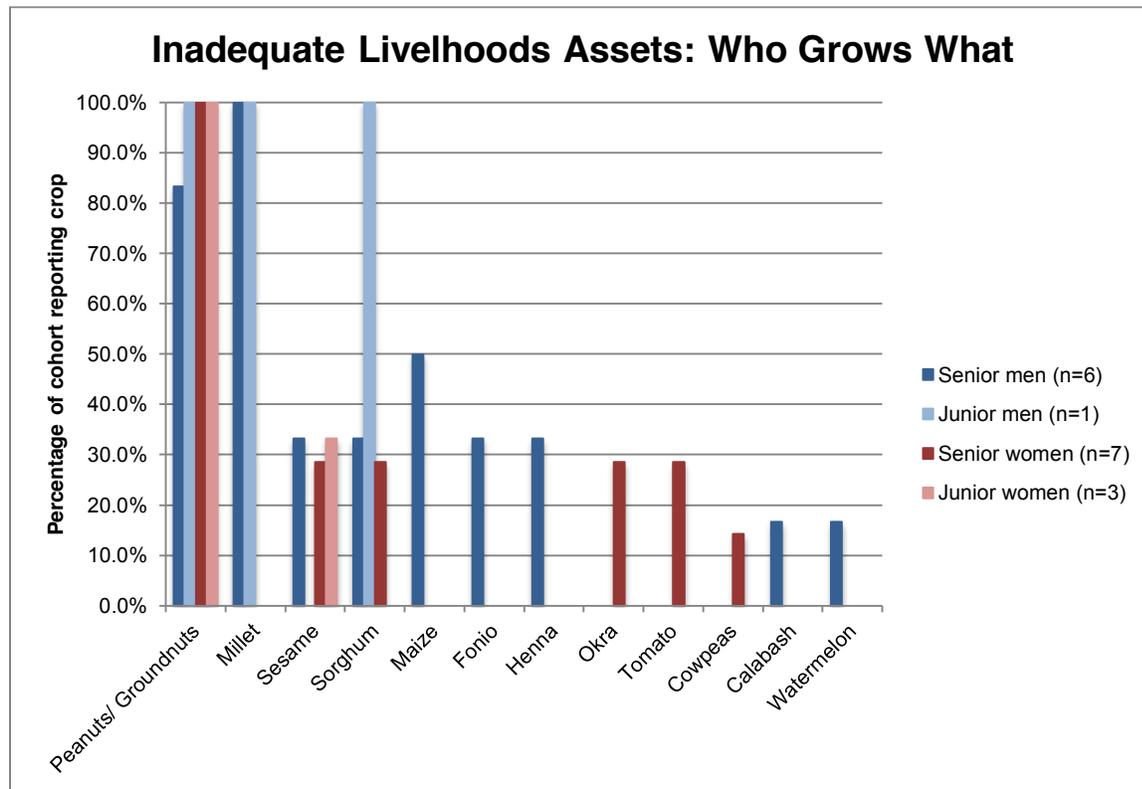
When we break out the livelihoods activities of this group by seniority/gender cohorts, some patterns emerge (Figure 5.4.20). First, women control gardening. Senior women garden more frequently than junior women, and junior women gather shea nuts while senior women do not. This suggests that the senior women in this group have access to more livelihoods resources, as they are able to garden and they do not have to gather shea, an indicator of food insecurity in this livelihoods zone. Men tend to control wage-paying NFE, while women earn NFE principally by engaging in petty trade.



**Figure 5.4.20: Reported livelihoods activities of those with inadequate livelihoods resource access, by gender/seniority cohorts.**

There are also seniority/gender cohort-specific patterns of crop selection in this group (Figure 5.4.21). Men dominate the cultivation of the staple grains millet, maize, and fonio, which aligns with expectations of their role as providers of grain and food to the family. Fonio is the lowest-priority of these grains, as four senior men in this group (Interviews #30, #37, #40 and #42) noted that they did not have enough time or land to cultivate this crop – suggesting that with more time, they would cultivate it more. Interpreting the patterns of sorghum cultivation is more complex. Junior women do not cultivate sorghum. Senior men and women cultivate this crop at roughly the same rate, but it is the least cultivated of the staple grains by senior men. The one junior man in this group cultivated sorghum, but it is unlikely this represents a seniority-specific difference in perception, as in 2012 40% of junior men in the Samakele sample reported cultivating this crop. This suggests a rate of cultivation more in line with that of senior men. The relatively low rate of cultivation of sorghum in this group, when coupled with comments like that of the senior man (Interview #37) who said he did not cultivate sorghum because he did not inherit enough land from his parents, suggests that it is also a low-priority grain in this group. In this group, men controlled the cultivation of henna, but only a few senior men cultivated this crop. Sesame production was engaged by senior men and junior and senior women at the same (very low) rate. This low rate of cash crop production is a result of the tradeoff these men must make between staple crop and cash crop cultivation, a tradeoff one senior man made clear in his discussion of henna cultivation. This man (Interview #45) noted that he did not cultivate henna because it takes too long (3-4 years) to become established which means that individuals with limited land will have to choose between immediate needs for subsistence and an activity that will generate significant money in the long term. Junior men appear even more constrained with regard to cash crop production, with the junior man in this cohort (Interview #15) arguing that he did not grow henna because he lacked draught animals,

equipment, and labor. While all cohorts commonly cultivate groundnuts, fewer senior men cultivate them than any other group.



**Figure 5.4.21: The crop selections of those in the Inadequate Livelihoods Resource Access group in 2014.**

More than in any other group, senior men in the Inadequate Livelihoods Resource group cultivate crops for the purpose of selling them (Figure 5.4.22). These men are still working to meet their obligation to supply grain and food to the household by cultivating millet, sorghum, and fonio for subsistence, and growing peanuts principally for subsistence with hope of a marketable surplus. However, these men are more likely to be selling some of their crops than in other groups, perhaps to raise the funds needed to improve their asset bases. The production of the one junior man in this group is completely subsistence-focused. However, this appears to be somewhat outlying behavior, as the junior men from Samakele in the 2012 dataset tended to see the crops they cultivated as somewhat more for market sale than the senior men. Women are also very focused on growing crops for food, but cultivating a marketable surplus. Women grow groundnuts both as food and as a means of raising funds for household needs, such as children’s clothing and school equipment, or social obligations like weddings and baptisms (Senior woman in Interviews #12 and #14). Sorghum, sesame, and tomatoes serve a similar purpose (junior woman in Interview #50, senior women in Interviews #08 and #14).

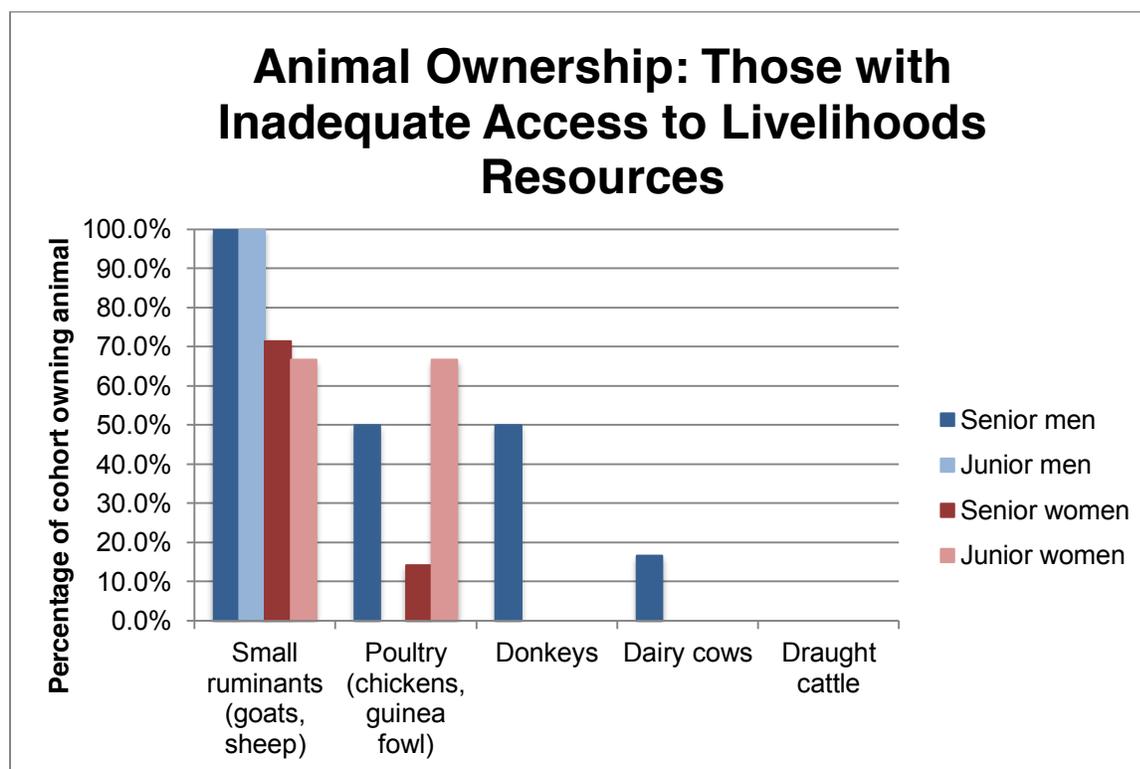
## Crop Use: Inadequate Livelihoods Resources

Crop	Avg	Interpreted value	n=
<b>Peanuts</b>			
Senior men	2	Eat more than sell	3
Junior men	1	Eat all	1
Senior women	2.9	Eat and sell equally	7
Junior women	2.3	Eat more than sell	3
<b>Sesame</b>			
Senior men	5	Sell all	2
Junior men			
Senior women	5	Sell all	2
Junior women	5	Sell all	1
<b>Maize</b>			
Senior men	1.67	Eat more than sell	3
Junior men			
Senior women			
Junior women			
<b>Henna</b>			
Senior men	5	Sell all	2
Junior men			
Senior women			
Junior women			
<b>Tomato</b>			
Senior men			
Junior men			
Senior women	3	Eat and sell equally	2
Junior women			
<b>Calabash</b>			
Senior men	5	Sell all	1
Junior men			
Senior women			
Junior women			
<b>Millet</b>			
Senior men	1	Eat all	6
Junior men	1	Eat all	1
Senior women			
Junior women			
<b>Sorghum</b>			
Senior men	1	Eat all	2
Junior men	1	Eat all	1
Senior women	3	Eat and sell equally	2
Junior women			
<b>Fonio</b>			
Senior men	1	Eat all	2
Junior men			
Senior women			
Junior women			
<b>Okra</b>			
Senior men			
Junior men			
Senior women	3	Eat and sell equally	2
Junior women			
<b>Cowpeas</b>			
Senior men			
Junior men			
Senior women	1	Eat all	1
Junior women			
<b>Watermelon</b>			
Senior men	5	Sell all	1
Junior men			
Senior women			
Junior women			

**Figure 5.4.22: The uses for cultivated crops in the High Livelihoods Resource Group in 2014, divided by gender/seniority cohorts.**

As in the other two groups, variety selection in the Inadequate Livelihoods Resource group focused on 90-day cycles for nearly all staple grains. This was true across genders and seniorities. Senior men did also plant 75-day cycles of maize, but at half the rate of 90-day cycles. The single largest variation from this pattern was senior men's selections of sorghum. While very few senior men grew sorghum, they selected either 120-day cycles or 75-day cycles. It is not clear why this broad split exists. In any case, there is little to separate the variety selections of the Inadequate Livelihoods Resource group from those of the other two groups in Samakele. These selections strongly suggest planting in situations where the season is very short, and where advisories have very limited utility.

Members of this group have the lowest rates of animal ownership in Samakele (Figure 5.4.23). Critically, they do not own draught animals, greatly constraining their ability to engage in agricultural production. Further, only 50% of the senior men in this group owned donkeys, suggesting that transporting cash crops like sesame and henna to market is particularly burdensome for those in this group. This group has the highest rates of small ruminant ownership in the village. Men in general report ownership of ruminants more frequently than women. Men and women both use them as stores of wealth to be used for needed household purchases and for family or other ceremonies. One junior woman (Interview #50) noted that her sheep and goats were sold for weddings and circumcisions, but their manure was also useful to fertilize her garden. Poultry remain of limited interest, even to this group. Like sheep and goats, poultry are used as a store of wealth. However, unlike with sheep and goats, some residents also ate poultry as well, suggesting these animals have limited savings value.



**Figure 5.4.23: The rates of animal ownership of members of the Inadequate Livelihoods Resource group in 2014.**

### 5.4.3. SAMAKELE: TOOLS OF COERCION

In Samakele, the discourses of livelihoods and the roles and responsibilities attached to different identities create a coherent logic that governs both what activities are undertaken, and who undertakes them. This coherence, however, does not fully explain why the residents of this community conform to these expectations. For example, because they do not own draught animals and do not farm cash crops, women’s incomes are greatly constrained, as are their social and economic options. Without independent incomes, they cannot risk divorce, nor can they easily start new businesses or raise the funds needed for what they perceive to be important household needs. Despite this, we see no divergence from this gendered pattern of animal ownership and cash crop cultivation. While the intersection of identity and livelihoods discourses makes such roles and outcomes appear natural to the residents of the community,

this does not by itself ensure that the residents of Samakele will adhere to expected roles and responsibilities. The enforcement of these roles and responsibilities comes through powerful tools of coercion that present steep sanctions to those who challenge this order. These sanctions reinforce the particular intersections of identity and livelihoods activities that produce the patterns of livelihoods decision-making observed in this village.

In Samakele, as in other parts of Mali dominated by the Bambara, authority flows through clear patterns of seniority and gender. Senior men have the greatest authority over decision-making within their households, and the most senior man in a concession has authority over all other men. A successful senior woman might develop some degree of voice within concession- or household-level discussions, but as long as there are men in her household or concession, her authority will not rise above that of a junior man. Following these structures of authority is paramount to Bambara social organization, and the organization of livelihoods activities. Those who challenge the authority of their seniors, or who disobey them create household disagreements (mentioned by senior men, senior women, and junior women), leads to mistrust (senior man and a senior woman) and even the separation of the concession and/or household (junior man and a senior woman). All of these outcomes might compromise the agricultural production of the concession and household, limiting men's ability to feed their families and generally limiting the food and economic security of all members of the family. Such behavior, therefore, is subject to steep, identity-specific sanctions.

Junior men are expected to obey their seniors, and to work hard for the concession and their household. Those that fail to live up to these expectations will be labeled as irresponsible (an outcome mentioned by 23% of the community) and unambitious (17% of the community), making it difficult to find a wife and start a family (11% of the community). This appears to be a very rare outcome, as the threat of being unable to find a wife appears to serve as a significant tool coercing junior men to conform to their roles and responsibilities.

On the whole, women face very stiff sanctions for failing to conform to the roles and responsibilities attached to their identities, especially the expectation of obedience and deference to men. The single most-mentioned sanction for a "bad woman" or a "bad wife" was to be divorced (mentioned by 62.3% of those sampled in the community). This is a disastrous outcome for women of any seniority, as they would lose access to land and other livelihoods resources. In the most extreme case, mentioned by one senior man (Interview #24), a divorced woman could find herself forced into prostitution for a living. Senior women face several sanctions. They risk being labeled as divisive (26.4% of the community) and selfish (20.8% of the community), running contrary to their role in the household and concession. They also risk losing the respect of others in the household and community, which greatly reduces their ability to provide advice and to bring the household together. Such women can be excluded from the family, which, like divorce, makes it very difficult to earn a living. They may also see their husbands take another wife. They also risk having their children be labeled as bad or unmarriageable. Senior women who disobey their husbands or who otherwise fail to live up to expectations appear to be very rare, as their specific sanctions were rarely mentioned by more than one or two residents of the community. Interestingly, in this group only one individual, a junior man, mentioned that a disobedient woman would be beaten. It is not clear if the threat of physical violence is exercised much less in this community than in others in southern Mali, or if residents simply chose not to report this sanction to the field team.

Junior women are subject to many of the same sanctions as senior women. Those who are married are threatened with divorce, and the likely ruin it would bring to their lives. Those junior women who are not yet married, and who choose to disobey their seniors or not live up to expectations, will find it very difficult to find a husband. Without a husband, a woman cannot have children, and therefore cannot become a senior woman in a household, concession, or community. This, in and of itself, is a significant

sanction that has long-term social (exclusion from decision-making) and material (lack of access to household resources) consequences.

Deviation from expectations, such as disobeying one's seniors, appears to be unusual. Two senior men (Interviews #28 and #38) noted that such challenges to authority have never happened. At the same time, this sort of challenge is clearly of concern to senior men in this community. Seven senior men noted that consulting with others in the concession or household prevented challenges to authority or disobedience, suggesting that traditional structures of authority alone are not enough to ensure compliance with expectations.

This need to maintain authority speaks to an important character of power in Samakele. The power relations embodied in Bamabara structures of decision-making engage all members of the community. While senior men have the greatest decision-making authority in the concession and household, they are expected to make good decisions that further the well-being of those under their authority. Failure to make good decisions can bring its own set of sanctions. Senior men who make bad decisions, or decisions that lead to problematic livelihoods outcomes, will be seen as indecisive and seen as incapable of managing his family. Such a senior man would lose status and respect and not be consulted or listened to, fundamentally stripping away a key aspect of what it means to be a senior man in this part of Mali. Eventually, such a senior man would be excluded from the family's and the community's decisions, could lose his wife/wives, might have his children turn against him, and could be cast out of the family and community, though these appear to be very harsh sanctions that only two members of the community mentioned. Thus, senior men are preoccupied with the food security of their concessions and households, to ensure they are meeting their responsibilities as senior men and therefore can avoid these sanctions.

In summary, the discourses of livelihoods that shape the definition of appropriate activities and the appropriate people to undertake those activities in Samakele are tightly interwoven with broad social expectations of individuals that are shaped at the intersection of seniority and gender. While such interweaving makes the patterns of livelihoods roles, responsibilities, and outcomes appear natural to those living in this community, the behaviors that produce these patterns are policed by strong sanctions that incentivize compliance with expectations. The roles that different individuals play, and the levels of autonomy they experience while playing those roles, are very durable, and therefore unlikely to change quickly or easily.

#### **5.4.4. SAMAKELE: DIFFERENT VULNERABILITIES, DIFFERENT DECISIONS**

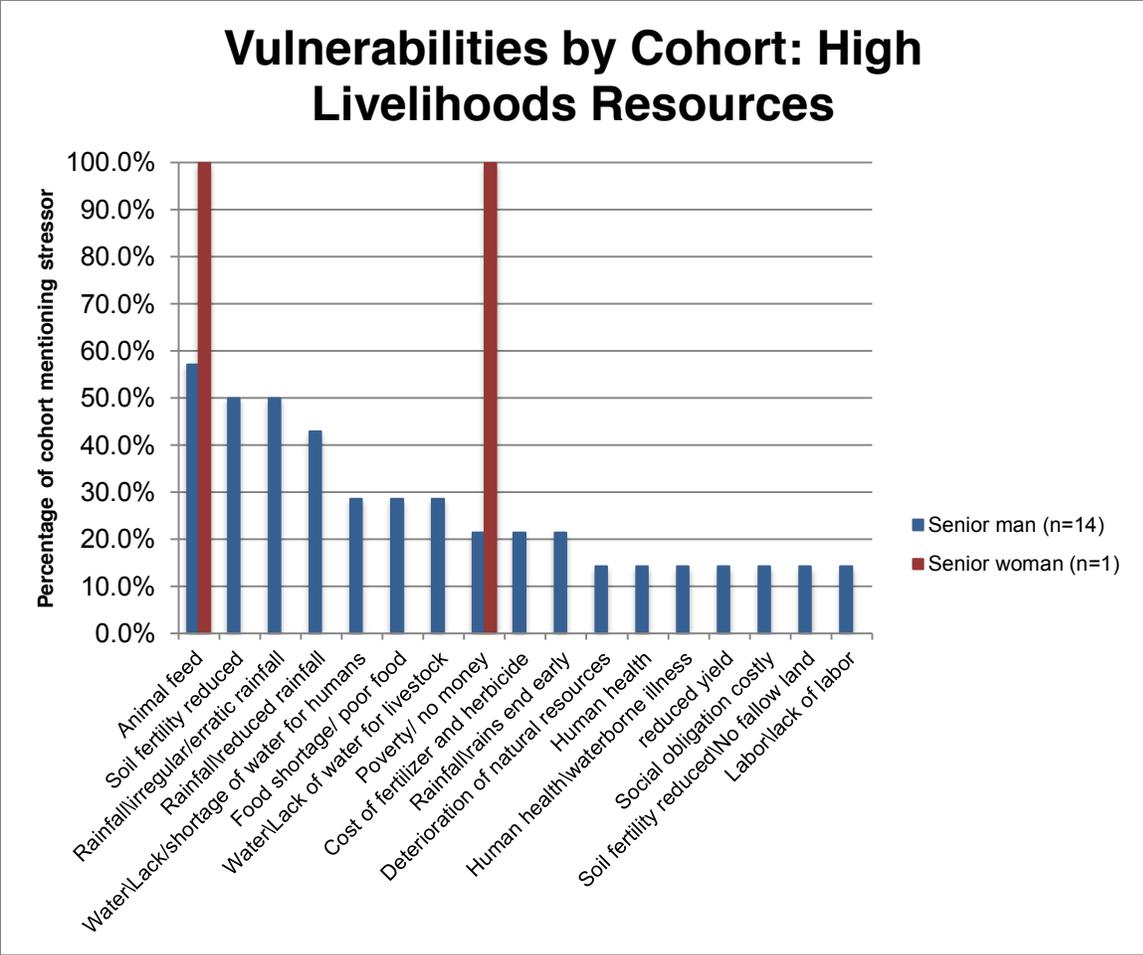
In Samakele, the roles and responsibilities that emerge at the intersection of gender and seniority play out in different ways depending on the livelihoods asset situation of the individual, household, or concession in question. These activities result in different exposures and sensitivities to stressors, and different adaptive capacities to address those stressors. The discussion of livelihoods decision-making and outcomes above allows us to rigorously interpret the different patterns of reported vulnerability seen in Samakele. This, in turn, allows us to understand the utility of climate services to different people in the community.

In the **High Livelihoods Resource group**, senior men (who comprise nearly everyone in the group) have relatively few concerns for their ability to make a living in Samakele (Figure 5.4.24). They are cultivating more than adequate supplies of grain to feed their households annually, and make decisions that lead the rest of their households and concessions to similar outcomes. While there is a concern for food shortage in this group, that concern is principally about senior men fulfilling their roles as providers of grain and food on an annual basis, not a reflection of a significant stressor. Their concerns are, instead, related to maintaining and growing their asset base, such as obtaining adequate feed and water for their animals and addressing the uncertainty around precipitation that shapes their harvest outcomes. Such

uncertainty has to be understood as part of a desire to make more money, not to squeeze out a living. The fact that these men are concerned with the cost of social obligations, such as providing materials for weddings and other ceremonies, suggests that they are expected to provide these materials because they are able.

Senior men with good livelihoods resources see advisory-informed crops as sources of subsistence that ensure the food security of the concession and household, and reinforce their own social status. They use cash crops like sesame and henna to raise needed cash incomes, meaning they have little interest in allocating extra labor to squeaking out a small marketable surplus from their staple grains. The advisories, as currently designed, only speak to their need to feed their families, a goal they are already quite adept at achieving.

Because only one senior woman was part of this group, it is not possible to generalize from her situation to that of women, or senior women, in this group with any reliability. Women in this group market surplus peanut production and garden crops. As the garden crops are effectively cash crops, these women are not forced to use peanuts as a key source of income. With limited labor power and time to farm (because they have to work on concession and household lands first, and then wait for equipment and labor to work their own land), these women are unlikely to expand their production into new staple grains for which there are advisories. Even if these women did expand their production into staple grains, they would be doing so late in the season, constraining variety selection to short cycles and limiting the utility of the advisories.



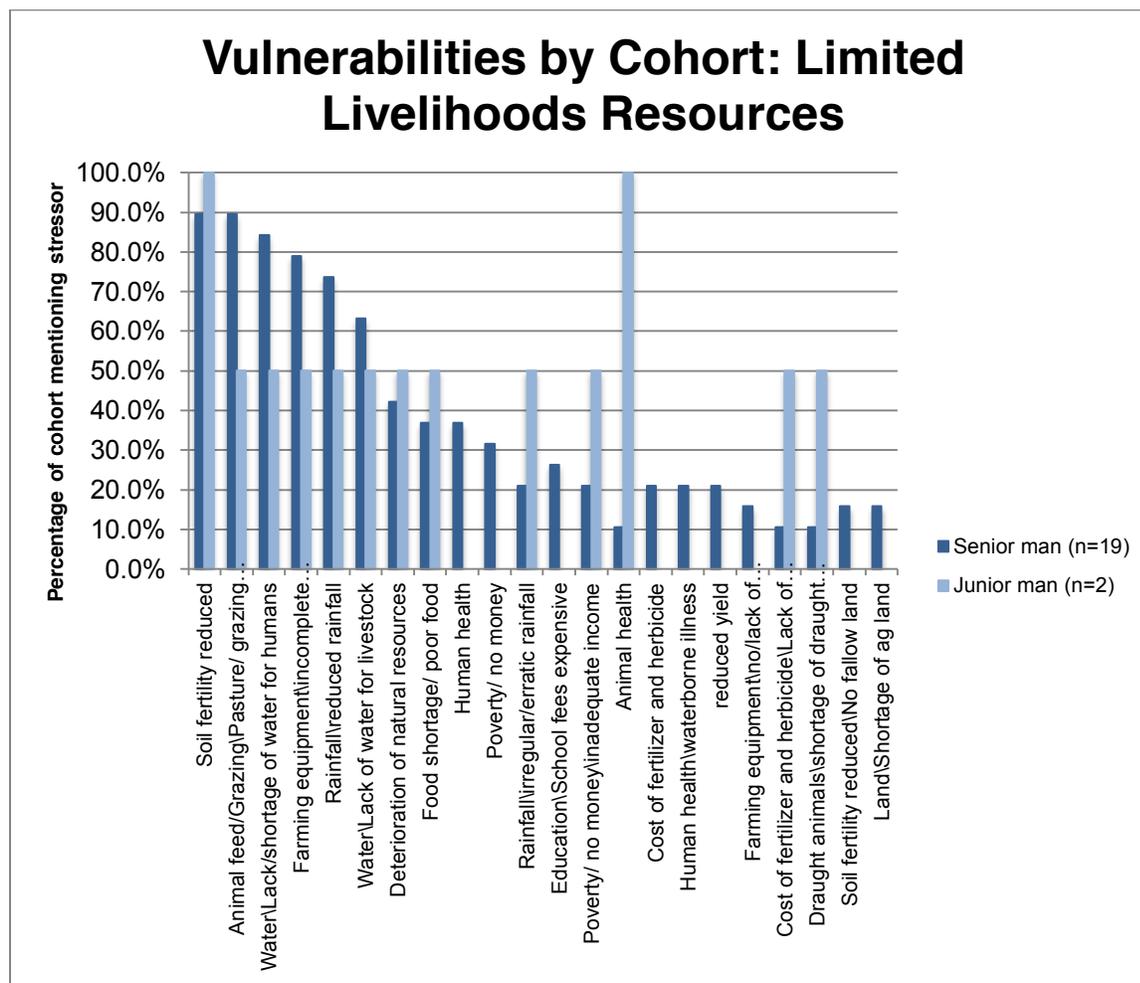
**Figure 5.4.24: Assemblages of vulnerability by seniority and gender in the High Livelihoods Resources group in 2014.**

In the **Limited Livelihoods Resources group**, a somewhat more precarious picture emerges (Figure 5.4.25). While most of the members of this group own draught animals, most have incomplete agricultural equipment and lack adequate access to land. Therefore, they cannot make the most of their access to traction. As a result, they are more concerned about soil quality and degradation than those with better livelihoods resource access as they have to make the most of the land they are able to cultivate when they obtain equipment. Overall, senior men are still able to cultivate enough grain, and make decisions that allow others to cultivate grain, such that they meet their obligations to the concession and household. However, because of the livelihoods constraints they face, they have a higher rate of concern for food security, and therefore for meeting their responsibilities as food and grain providers, than senior men in the High Livelihoods Resource group.

Junior men lack the authority to make agricultural decisions on their own. Therefore, they lack both the means and the authority to use the advisories, but the fact is that the senior men in this group are the most interested in the advisories and therefore would likely allow their use for junior men. Junior men are concerned with producing enough grain to have a marketable surplus that will allow for the purchase of needed equipment and animals to make them viable candidates for marriage and to improve their overall status in the community. In this cohort, however, the difference between junior and senior men, with regard to advisory use, is very small. As with senior men, rainfall presents a challenge to all of the

goals of junior men. While the number junior men in this cohort is very small and therefore difficult to generalize, by examining their crop selection and crop uses, and understanding the roles and responsibilities they occupy in this community, we know that their lower rates of concerns for pasture and water for animals reflect lower levels of animal ownership than senior men in this group. Similarly, concerns for animal health reflect low rates of animal ownership, where illness could wipe out a significant portion household resources. These junior men also have relatively limited access to good land, raising their concerns for soil fertility and quality, and making issues of variable rainfall very important to their agricultural outcomes.

Senior men with limited livelihoods resource access appear to be the group most engaged with the advisories, but their rate of use is very low. Junior men in this group do not use them at all. To better use the advisories, men need to have timely access to livelihoods resources like draught animals and equipment. Without such access, these men often find themselves waiting to farm until the season is short and the choices of cycle length are reduced to the shortest cycles possible. Such waiting also forces these men to prioritize staple grains, and to plant these grains in the order of most to least viable. As a result, advisories that provide information on seasonal length and the distribution of precipitation to help them parse the most viable grains for the remaining season could be of great use to these men.



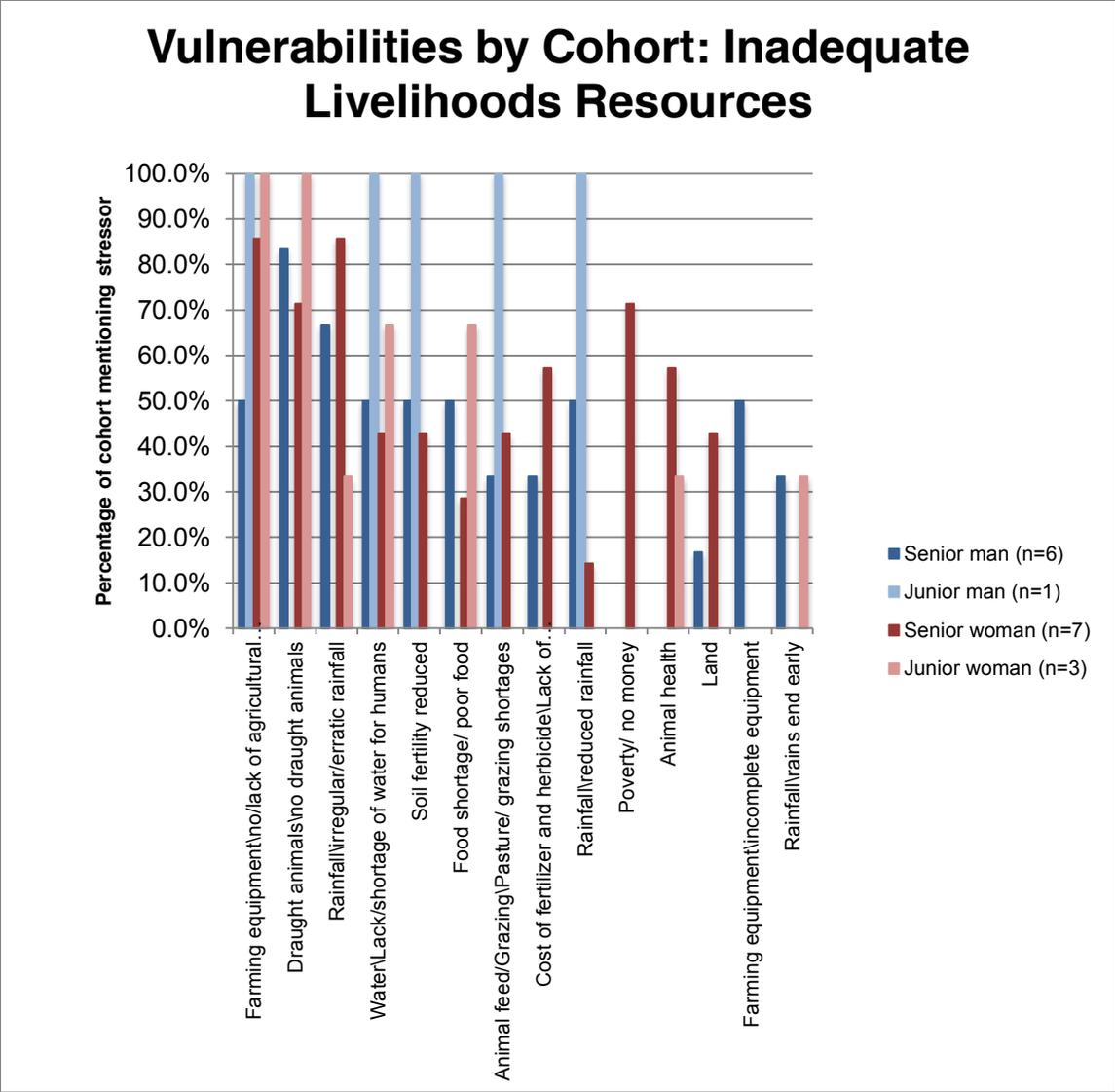
**Figure 5.4.25: Assemblages of vulnerability by seniority and gender in the Limited Livelihoods Resources group in 2014.**

Because they are the most diverse group with regard to identity, those in the **Inadequate Livelihoods Resources** group present the most complex picture of decision-making and vulnerability in Samakele (Figure 5.4.26). Senior men in this group are fundamentally concerned with access to livelihoods resources like agricultural equipment and draught animals. Without the ability to farm large areas, or to plant in a timely manner, more of these men are concerned with erratic and declining rainfall than with soil quality, as the rain (especially the duration of the rainy season) is the greatest determinant of their agricultural outcomes. These men report high rates of concern for food security, and therefore for meeting their responsibilities as senior men.

The junior man in this group is difficult to generalize, except to say that his concerns reflect the fact his agriculture is a subsistence activity, and he raises needed income through nonfarm employment working as a blacksmith. Therefore, he is concerned about stressors that impact his agricultural outcomes, such as erratic rainfall, but is not concerned with food security because he is not a senior man, and because he has nonfarm employment that allows him to earn enough to feed his family in the absence of adequate agricultural production. Senior women are the group most concerned with the lack of money and capital in their households. They are also concerned with a lack of equipment and land, though these concerns are all mostly focused on gardening activities. The high rate of concern for animal health among these women relates to the fact they have used a significant portion of their gardening and other incomes to purchase small animals, which are means of storing wealth.

Men with inadequate livelihoods resources are interested in the advisories, but face significant barriers to their use. While senior men have the authority to use advisory data in their agricultural decision-making, they generally lack the capacity to do so in a timely manner. By the time they access needed resources, such as draught animals and farming equipment, the season has run too late to allow for nuanced variety selection or the careful timing of inputs. Instead, these men are forced into short cycles of the few crops they cultivate. Further, because they plant late, they have to prioritize grains and therefore are unlikely to diversify into new grains unless their asset situation changes.

Women have similar positions with regard to advisories, regardless of their seniority. Junior women are in a similar situation with regard to their own livelihoods activities, but do show greater concern for stressors related to rain-fed agriculture, perhaps because impacts on their husbands' incomes have bearing on their long-term well-being. Senior and junior women with limited livelihoods resources, like junior men in this group, have neither the authority nor the means to follow advisories. The demands placed upon their labor by the concession and household make the timely use of advisories nearly impossible, and greatly limit the ability of women to diversify into other advisory-informed crops.



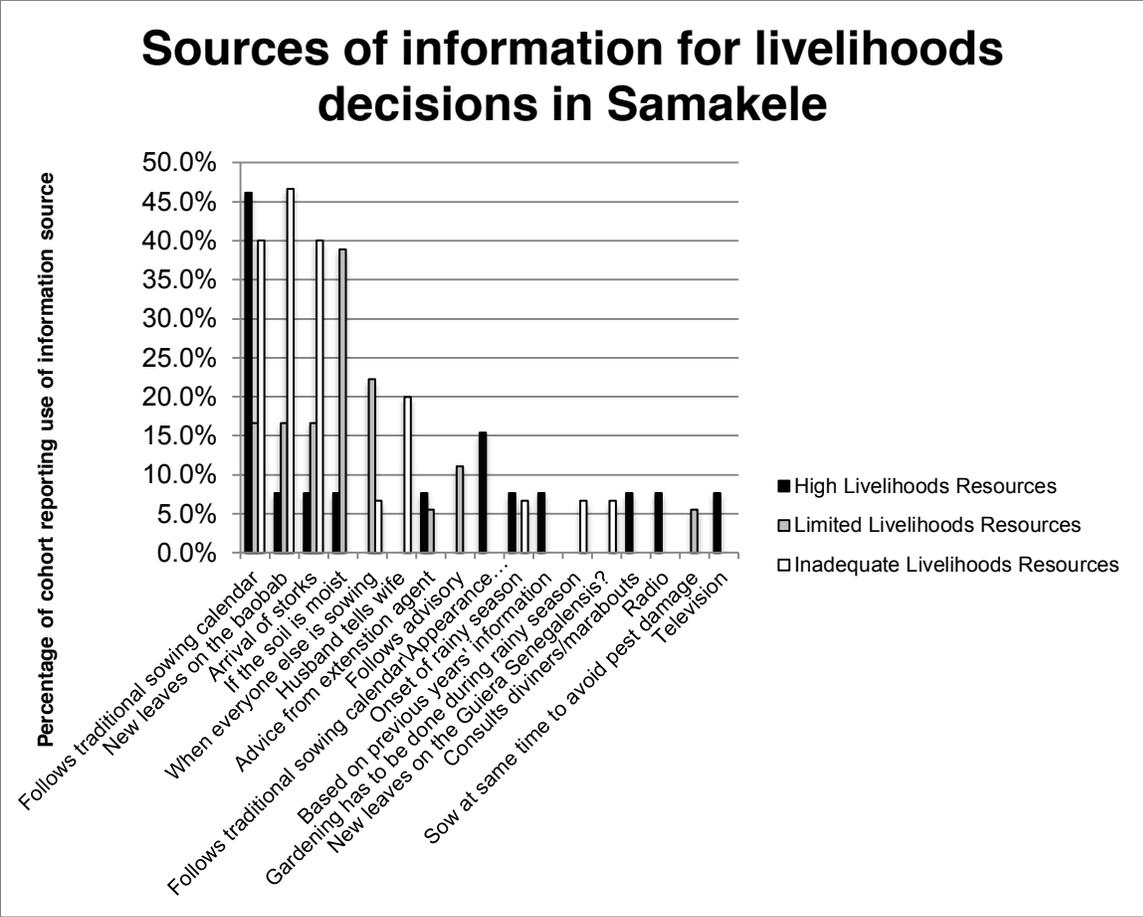
**Figure 5.4.26: Assemblages of vulnerability by seniority and gender in the Inadequate Livelihoods Resources group in 2014.**

**5.4.5. SAMAKELE: EXPLAINING EXISTING ADVISORY USE**

The foregoing analysis demonstrates that the low levels of advisory use in Samakele reflect a concentration of advisory use among senior men in this community, and in the larger livelihoods zone to which it belongs. Generally speaking, such men have the authority to make agricultural decisions, and therefore have the ability to incorporate advisories into their decision-making process. However, not all senior men use the advisories, and those that do are not, perhaps, those we would expect. Of those in the High Access to Livelihoods Resources group, only 13.3% were using forecasts of any sort, and none clearly demonstrated that they were using the advisories. In Samakele, those with the greatest livelihoods resources, and therefore the greatest capacity to respond to and follow agrometeorological advisories, followed the traditional calendar, and did not appear to follow any other sources of information in great numbers (Figure 5.4.26). Clearly, the use of this calendar has worked for them to this point, as they have cultivated enough to build up their livelihoods asset base and ensure necessary access to land to ensure food security for themselves and their families. These men are using cash crops specifically to bring in

cash incomes from their agricultural efforts, and therefore cultivating marketable surpluses of their staple grains is not a priority, making the use of advisories of little interest to these men. Instead, it appears most likely that senior men with limited livelihoods resources are using the advisories, with 16.7% of this group using forecasts of some sort, and 11.1% using the advisories. The limited livelihoods resource group deviates from heavy use of the traditional agricultural calendar when making decisions about what to plant and when, and paid little attention to local indicators like the flowering of the baobob tree or the appearance of storks (both reported frequently in the Inadequate Livelihoods Resource group). These are men with limited resources and somewhat limited access to land, who are seeking to maximize their returns on limited investments of time and inputs. They may be seeking any advantage to improve their yields and their chances of a strong harvest. Those in the Inadequate Livelihoods Resource group have the least capacity to act on advisories, as they lack the equipment and other resources that would enable rapid response to advisory information. Nobody in this group reported using forecasts or advisories. Instead, these men depended the most on traditional calendars and biophysical indicators to determine when to plant.

The rates of use in this group are so low, and the sample so concentrated on senior men, that it is difficult to discern if seniority or gender have a meaningful impact on the use of advisories. The use of different forms of information represented in Figure 5.4.27, which clearly varies by access to livelihoods resources, does suggest that this access greatly shapes agricultural strategy. However, it appears that in Samakele, and perhaps in much of Zone ML09, advisories are not meeting current needs such that farmers feel the need to consult them.



**Figure 5.4.27: Sources of information for agricultural decision-making consulted by different groups in Samakele.**

# REFERENCES

- Akeredolu, M., Asinobi, C.O., Ilesanmi, I., 2007. Gender and Trends in Production Constraints among the Bambara People of Mali, in: Proceedings of the 23rd Annual Meeting of the Association for International Agricultural and Extension Education. Polson, Montana, pp. 1–13.
- Assé, R., Lassoie, J.P., 2011. Household decision-making in agroforestry parklands of Sudano-Sahelian Mali. *Agrofor. Syst.* 82, 247–261. doi:10.1007/s10457-011-9395-2
- Becker, L.C., 2000. Garden money buys grain: Food procurement patterns in a Malian Village. *Hum. Ecol.* 28, 219–250. doi:10.1023/A:1007020104053
- Becker, L.C., 1990. The collapse of the family farm in West Africa? Evidence from Mali. *Geogr. J.* 156, 313–322.
- Bishaw, B., Neufeldt, H., Mowo, J., Abdelkadir, A., Muriuki, J., Dalle, G., Assefa, T., Guillozet, K., Kassa, H., Dawson, I.K., Luedeling, E., Mbow, C., 2013. Farmers' Strategies for Adapting to and Mitigating Climate Variability and Change through Agroforestry in Ethiopia and Kenya, Farmers' Strategies for Adapting to and Mitigating Climate Variability and Change through Agroforestry in Ethiopia and Kenya. Forestry Communications Group, Oregon State University, Corvallis, Oregon.
- Carr, E.R., 2015. Political Ecology and Livelihoods, in: Perrault, T., Bridge, G., McCarthy, J. (Eds.), *The Routledge Handbook of Political Ecology*. Routledge, New York, pp. 332–342.
- Carr, E.R. (Ed.), 2014a. Assessing Mali's Direction Nationale de la Meteorologie Agrometeorological Advisory Program: Preliminary Report on the Climate Science and Farmer Use. United States Agency for International Development, Washington, DC.
- Carr, E.R., 2014b. From Description to Explanation: Using the Livelihoods as Intimate Government (LIG) Approach. *Appl. Geogr.* 52, 110–122.
- Carr, E.R., 2013. Livelihoods as Intimate Government : Reframing the logic of livelihoods for development. *Third World Q.* 34, 77–108.
- Carr, E.R., 2008. The millennium village project and African development: problems and potentials. *Prog. Dev. Stud.* 8, 333–344. doi:10.1177/146499340800800403
- Dixon, S., Holt, J., 2010. *Livelihood Zoning and Profiling Report: Mali*. Washington, DC.
- Easterly, W., 2006. *The White Man's Burden: Why the West's Efforts to Aid the Rest Have Done So Much Ill and So Little Good*. The Penguin Press, New York.

- Ferguson, J., 1994. *The Anti-Politics Machine: Development, Depoliticization, and Bureaucratic Power in Lesotho*. University of Minnesota Press, Minneapolis.
- Förster, T., 1998. Land use and land rights in the West African savannah: The Senufo in northern Côte d'Ivoire. *GeoJournal* 46, 101–111.
- Grigsby, W.J., 2004. The Gendered Nature of Subsistence and Its Effect on Customary Land Tenure. *Soc. Nat. Resour.* 17, 207–222.
- Grigsby, W.J., 2002. Subsistence and land tenure in the Sahel. *Agric. Human Values* 19, 151–164.
- Grigsby, W.J., 1996. Women, Descent, and Tenure Succession among the Bambara of West Africa: A Changing Landscape. *Hum. Organ.* 55, 93–98.
- Grischow, J., McKnight, G., 2003. Rhyming Development: Practising Post-development in Colonial Ghana and Uganda. *J. Hist. Sociol.* 16, 517–549.
- Hansen, J.W., 2002. Realizing the potential benefits of climate prediction to agriculture: issues, approaches, challenges. *Agric. Syst.* 74, 309–330.
- Hellmuth, M., Diarra, D., Vaughan, C., Cousin, R., 2011. *World Resources Report Case Study. Increasing Food Security with Agrometeorological Information: Mali's National Meteorological Service Helps Farmers Manage Climate Risk*. Washington, D.C.
- Ingram, K., Roncoli, M., Kirshen, P., 2002. Opportunities and constraints for farmers of west Africa to use seasonal precipitation forecasts with Burkina Faso as a case study. *Agric. Syst.* 74, 331–349.
- Leclerc, C., Mwongera, C., Camberlin, P., Boyard-Micheau, J., 2013. Indigenous Past Climate Knowledge as Cultural Built-in Object and Its Accuracy. *Ecol. Soc.* 18, 22–34.
- McKinnon, K., 2007. Postdevelopment, Professionalism, and the Politics of Participation. *Ann. Assoc. Am. Geogr.* 97, 772–785.
- Mitchell, T., 2002. *Rule of Experts: Egypt, Techno-Politics, Modernity*. University of California Press.
- Nightingale, A.J., 2005. “The experts taught us all we know”: Professionalisation and knowledge in Nepalese community forestry. *Antipode* 37, 581–604.
- Orlove, B., Roncoli, C., Kabugo, M., Majugu, A., 2010. Indigenous climate knowledge in southern Uganda: the multiple components of a dynamic regional system. *Clim. Change* 100, 243–265.
- Peterson, N.D., Broad, K., Orlove, B.S., Roncoli, C., Taddei, R., Velez, M.-A., 2010. Participatory processes and climate forecast use: Socio-cultural context, discussion, and consensus. *Clim. Dev.* 2, 14–29.

- Republique du Mali, 2009. 4 ème Recensement General de la Population et de l'Habitat du Mali (RGPH). Résultats définitifs. Tome 0: Répertoire des villages. Bamako.
- Rist, G., 2007. Development as a buzzword. *Dev. Pract.* 17, 485–491.
- Roncoli, C., Ingram, K., Kirshen, P., 2002. Reading the Rains: Local Knowledge and Rainfall Forecasting in Burkina Faso. *Soc. Nat. Resour.* 15, 409–427.
- Roncoli, C., Ingram, K., Kirshen, P., 2001a. The costs and risks of coping with drought : livelihood impacts and farmers ' responses in Burkina Faso. *Clim. Res.* 19, 119–132.
- Roncoli, C., Ingram, K.T., Kirshen, P., Jost, C., 2001b. Burkina Faso: Integrating Indigenous and Scientific Rainfall Forecasting. *IK Notes* 39, 1–4.
- Silvestri, S., Bryan, E., Ringler, C., Herrero, M., Okoba, B., 2012. Climate change perception and adaptation of agro-pastoral communities in Kenya. *Reg. Environ. Chang.* 12, 791–802.
- Skinner, E.P., 1959. Ethnology and Ethnography: Les Senoufo (y compris les Minianka) B. *Holas. Am. Anthropol.* 61, 321–322. doi:10.1109/MCD.2000.888870
- Tarhule, A., Lamb, P.J., 2003. Climate Research and Seasonal Forecasting for West Africans: Perceptions, Dissemination, and Use? *Bull. Am. Meteorol. Soc.* 84, 1741–1759.
- Tilley, H., 2011. *Africa as a Living Laboratory*. University of Chicago Press, Chicago.
- West, C.T., Roncoli, C., Ouattara, F., 2008. Local Perceptions and Regional Climate Trends on the Central Plateau of Burkina Faso. *L. Degrad. Dev.* 304, 289–304.





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